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The World's Fat Position

IT is impossible to consult any recent literature bearing on the industries which use fats without becoming acutely aware of the world shortage of raw materials. There is in many countries, possessing the most diverse political systems, an intensive search for new sources of fat. It is true that at the moment countries like Britain and America rely primarily on natural products. The principal oils and fats used in soap manufacture in the U.S.A., for example, expressed in round figures and in millions of pounds, are as follows: Tallow 660; coconut oil 307; whale oil 160; grease 99; palm oil 78; olive foots 24; the total of all the oils and fats being 1,602 millions of pounds. The preliminary report No. 13 of the Import Duties Act Inquiry gave the British raw materials of the soap industry in thousands of hundredweights as follows: solid fats 2,544.3; fatty oils 1,295; tallow 973.6; hardened whale oil 739.7; paraffin wax and scale 701.8; various hydrogenated fats 129.8; and stearic acid 41.4.

The research that has been conducted in many countries has led to new developments in the production of synthetic fats, and is one more example of the ability of the chemist to produce substitute materials for those which nature does not provide in sufficient abundance. One line of development, for example, is the preparation of synthetic fats by the combination of fatty acids with glycerine. It has been found economical to purify free fatty acids from inferior grades of olive oil by distillation, and then to re-synthesise olive oil of high grade. These esterification processes are not as yet perfected, but they are expected to lead to interesting developments.

The production of fatty acids by oxidising petroleum products, usually paraffin wax, has been regarded as a method of providing the necessary synthetic fats in more than one country. This idea was initiated as long ago as 1878, but did not come to the fore until after the War. In Germany, according to one published process, melted paraffin wax is oxidised thoroughly with air in the presence of manganese acetate and sodium carbonate at temperatures of 110 to 115° C. Saponification with alkali and splitting with acid separates the fatty acids from the oxidised material. This process is said to give rise to a yield of 47 per cent. of distilled clear white products suitable for the best soaps. It has recently been announced in the German press that the first successful step has been accomplished in the production of fats from coal. Works with an annual capacity of 20,000 tons of soap made from coal are said to be already in existence, and it is stated that within a short time the output will be as high as 60,000 tons per year, the cost of production being little higher than that when processing natural fat. Owing to the great emphasis laid in Germany on any process which tends towards self-sufficiency and economy, it is difficult to determine the actual importance and value of the preparation of soap from coal, or whether such a manufacture, utilising oil obtained from coal, can actually be undertaken economically. In any case, since more than a quarter of the German fat imports go to the making of soap, the importance of these new developments to that country may be very great indeed.

Another country actively engaged in the search for synthetic fats is Russia. The first Five-Year plan called for 400,000,000 tons of fats, and as Russian work on the conversion of paraffin wax did not yield good results, largely because oxidising temperatures as high as 160° C. seemed to be indicated, attention was turned to the oils distilled from petroleum. These can be treated at a lower temperature, but there is the problem of getting rid of the oxy-acids which cause difficulties in purifying and bleaching. In one Russian method the oils are purified by sulphonation, the separated oil is neutralised with caustic soda, oxidised at atmospheric pressure, and at a temperature of 90 to 115° C. for 48 hours, using calcium naphthenate as catalyst. A yield of 15 to 20 per cent. of fatty acids is said to be produced, and this oil is neutralised with caustic soda, the soap which thus forms being separated by settling. The residual oil is submitted to subsequent re-oxidation.

In America attention is being paid to "tall oil," a by-product of paper manufacture, which has also been used for the same purpose in the Scandinavian countries. Pinewood is rapidly displacing other woods for the manufacture of paper, and for this reason the potential production of soap from tall oil has been placed as high as 100,000 tons a year. In the process the wood is cut into pieces some half an inch to an inch square by one-eighth of an inch thick, is steamed with caustic soda solution under pressure for several hours, after which the pieces are separated, pulped and made into paper. The fats and resins are saponified by the treatment and are present in the waste liquor as soaps. Upon evaporation these soaps grain out on adding salt, just as soaps do in the soap kettle. These world-wide developments seem likely to change the sources of certain raw materials fundamentally, and no doubt the various trades concerned will be watching the position carefully. The magnitude of the issues at stake may be gauged from the fact that in 1935 the British soap industry bought raw materials to the value of £13,067,000; and in the same year, according to official statistics, sold finished products to the value of £26,255,000.

Notes and Comments

Concessions in the Trade Pact

IT is good to learn that the official negotiations with the United States concerning the proposed trade agreement will be approached with the object of granting mutual concessions and of adjusting these to the benefit of both parties. In a letter to the Association of British Chambers of Commerce, Mr. Oliver Stanley, President of the Board of Trade, stated that concessions will have to be made but the probable effect of every concession will be most carefully weighed. He added that most careful consideration will always be given to the facts of each case before any undertaking is entered into which would affect the interests of a British industry. There has been the feeling that it would be of most value to the trade of this country at the present time if we entered into negotiation with the firm intention of making no concessions but to hear what the other side had to offer. A note in the issue of December 18, pointed out that unless both parties to the proposed agreement were prepared to make concessions, negotiation would be objectless. The statement of the President of the Board of Trade must be highly reassuring to many.

The Metric System

THE case for adoption of the metric system was presented strongly by Sir Isidore Salmon, M.P., presiding at a lecture, given under the auspices of the Institute of Export, by the Rev. A. J. Stubbs. He claimed that Britain is actually losing millions of pounds annually because of our antiquated system of £ s. d. and weights and measures. He said that everything should be done to bring before the Government the urgent necessity of appointing a committee to inquire into the whole question. Mr. Stubbs, vice-chairman of the Decimal Association, said that of our overseas trade 64 per cent. went to decimalised coinage countries and for export purposes we had to manufacture different sizes of machined products, other goods or cartons, and effect intricate internal calculations. No one can deny that the metric system once installed would be far more advantageous than our present system of weights and measures. There is the anomaly that in the laboratory we talk of grams and litres and in the works of lbs. and gallons. The change would not only necessitate certain scrapping or recalibration of standard weights and measures, but more difficult, we should have to become entirely metrically-minded.

Grass Drying

DR. R. E. Slade gave an interesting account of the progress made in the drying of grass in a lecture before the Institution of Chemical Engineers. Shortly after the war it was discovered that young grass was a more valuable foodstuff than was expected and its preservation was suggested. In 1927 dried grass made at Billingham was fed to cattle with entirely successful results. Since 1927 Imperial Chemical Industries, Ltd., have investigated the construction of grass driers, suitable to be operated on the farm, and the cost of growing, harvesting and drying. It has been shown that grass can be grown and dried at a cost which is lower than the price of equivalent amounts of imported foodstuff. Dr. Slade said, however, that the driers at present on the market are of a size suitable for farms of 150-300 acres of grass, while most of the farms in this country have less than 100 acres of grass. A small drier is therefore needed, which must be both efficient and simple. It must also be considerably lower in price than those available to-day or farmers will be unable to buy them. Dr. Slade described experiments which he had made last summer on the production of a small drier suitable for farms with 50 to 100 acres of grass. The drier is inexpensive and efficient. It consists essentially of a single fixed tray about 2½ feet deep which is filled with grass to a depth of about 2 feet through which heated air is blown by means of a fan. It is interesting that this simple form of drier should give on test a heat efficiency at least as high as that obtained before with the many ingenious, and often complicated, driers devised. The importance of grass drying can be estimated when it is realised, as Dr. Slade points out, that by fertilising grassland and preserving the young grass by drying, it is possible to grow 10 cwts. of crude protein per acre and 30 cwts. of starch equivalent per acre, grassland makes the best use of nitrogenous fertilisers, the only preserved food which has the vitamins required by animals is dried grass—or perhaps grass silage, and dried grass has a very much higher mineral content than any other food available.

Scheme for Sugar Research

AS a result of the poor crop of this year's beet, sugar factories in East Anglia have either already closed or will close shortly. The factories usually run until the end of January. In view of this state of affairs, a scheme submitted to the Minister of Agriculture by the Sugar Commission is timely. The scheme provides for the establishment of three research and education committees which will be concerned with the growing of sugar beet, the manufacturing and refining of sugar, and marketing and consumption, respectively. The economic side of the sugar beet industry has rarely given satisfaction. When it is considered that the cost of beet accounts for three-quarters of the total cost of producing the refined sugar, the high price being necessary to induce farmers to grow the necessary beet, it would appear that close investigation and research are desirable. The submitted scheme shows how this valuable work may be carried out.

Lord McGowan on the Future of Trade

THIS week's *Sunday Times* published the opinions of a number of leaders of industry on the trade prospects for 1938. Lord McGowan wrote: " Facing the facts as we see them, I feel that we can look forward to 1938 with confidence. Despite political unrest abroad, a pleasing feature of British industry during the year just closing is the increase in the export trade of the country, and I hope that every effort will be made further to increase our sales abroad during the coming year so that if in course of time there may be a temporary recession in our home trade our increase in export business will help to compensate. The chemical industry is basic and a barometer as to how trade is going, and I am glad to say that it is working at very high pressure throughout the country. By spending freely on research we shall discover new outlets for our industries and improve our present processes, resulting in greater efficiency and lower costs; thus we shall become more and more competitive with the rest of the world. It appears to me that we are going through a period of readjustment, and that the stage is set for further recovery. If the prices of commodities rise, which I think is not at all unlikely, then the buying power of the world is increased and we shall be in for a continued period of prosperity. I repeat that I look forward with confidence to 1938."

Chemical Developments in the Rubber Industry

Review of Progress during the Past Year

By
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THE preparation and application of latex still provides the most fruitful field of activity. The possibilities of other latex bearing plants continue to attract attention, especially in Russia, where the solidago plant and the tausagiz shrub are regarded as likely raw rubber providers as supplementary supplies to the synthetic industry. Investigation of yields shows the roots to be the principal sources of supply, younger plants containing less rubber than old.[1]

In the field of Hevea latex production there are further suggested additions to the materials to be used to improve the processing qualities in one way or another. Thus lipins or sterols, such as lanolin, emulsified in water, are claimed[2] to prevent the formation of films, bubbles, and foam for many hours, an addition of rape seed oil extending the time of protection to several days. Hydroxylamine, in amounts up to 0.25 per cent., is stated to be an excellent germicide.[3]

The stabilisation of latex may be effected by the use of an aqueous solution of potassium or sodium silicate and potassium carbonate added to the latex prior to concentrating,[4] while an irreversible gel may be obtained by mixing latex containing 70 per cent. of rubber and 0.75 per cent. ammonia, with the fluid gel obtained by mixing sodium silicate solution of suitable concentration with an aqueous acid.[5] Thickeners for latex are well represented in recent patents and latex can be thickened almost to the consistency of butter, so that it may be cut up into any required shape.[6]

These show only a few of the ingenious ways in which latex can be treated to render it more certain in handling and application. Suggested improvements to mixtures of latex and the handling of the same in commerce are equally numerous. The production of wrinkled or roughened surfaces on the latex goods, such as bathing shoes and hot water bottles, has been an interesting study for several years. Various new processes for obtaining this effect have been suggested, in one of which the latex layer is coagulated from the inside, the swelling agent being applied before drying.[7]

Production of Dyed Rubber Materials

A novel method for the production of dyed rubber products from latex describes the treatment of a former with a substantially non-coagulating dye, for example methyl violet, a coagulant, and/or an adhesion-preventing material such as mica. The latex is then deposited on the former and the coagulated rubber is kept in contact with the former sufficiently long for the dye to diffuse into the wet rubber which is afterwards dried.[8] The problem of sealing envelopes with a latex preparation has been attempted many times, but in most cases on opening the envelope the rubber between the paper pulled off in long strings which were inclined to stick to the fingers. Recent development, however, has resulted in a satisfactory combination of gum and rubber to overcome this objection, and in addition it has been found possible to apply the idea to glazed and greaseproof papers.[9]

Work on the production of rubber of a low rate of water absorption has been continued and among methods proposed is one to treat latex with absorbent media, such as active carbon or silica gel,[10] in order to produce a rubber with low non-rubber constituents. In the opinion of one author, following extensive research,[11] the soluble substances rather than proteins are responsible for the absorption of water by rubber. He described various methods of purifying rubber and showed that crepe rubber purified by heating in ammonia vulcanised and aged satisfactorily, had a low moisture absorption, and a high degree of dielectric stability in water.

While aqueous dispersions of rubber, other than latex, do not attract general attention, the production of such dispersions meets a very definite commercial demand. In the production process hydrophilic fillers may be added to a very plastic rubber mix which is treated with 2 per cent. aqueous KOH 40-60°, and the stabilisers added to facilitate the concentration by heating under reduced pressure. As with latex such agents as lipins or sterols serve to prevent film, bubble and foam formation, and there are many suitable agents for assisting the wetting out and dispersing process. Thus, the salts of shellac with a strong volatile nitrogen base are suggested for this purpose,[12] and also as stabilising agents.

Rubber Derivatives

Some of the rubber derivatives, notably chlorinated rubber, have long since passed the experimental stages and become important in actual manufacturing processes. Interest in such products is no less in evidence, however, and improvements in the methods of preparation of the chloro derivatives and their development in new directions continue. Of these, transparent films, tracing cloths, fireproof and soundproof partitions, and flooring compositions are some of the more important examples.[13] When dissolved in tars the chlorinated rubbers have been found[14] to give products of considerable elasticity, which may be mixed with granite dust and moulded to form well-bound resilient blocks. Such elastic products may also be prepared by the direct chlorination of solutions or dispersions of rubber in tar oils, in which case the product consists of chlorinated rubber in chlorinated tar oil. Development of other halogenated rubbers has naturally followed the success with the chloro-compounds, and the preparation of fluorine compounds can be successfully carried out by using dilute gas or by carrying out the fluorination below 0° C.[15]; dilution with nitrogen reduces the risk of fire during the substitution. The products are suitable for use in varnishes, as packings to render fluorine electrolysis cells fluid-tight, and for insulating.

A method for producing a thermoplastic rubber consists[16] of milling into rubber an organic or inorganic compound (PCl_3, PCl_5, $SbCl_3$) which with water yields an acidic compound, and a compound, such as $Al_2(SO_4)_3$, $18H_2O$, which liberates water when heated. In another process a rubber of a permanently sticky character is prepared [17] by the incorporation of an aromatic NO—compound, preferably 2 to 5 per cent., and exposing the mixture to air for a few days, or heating in air to 141° for a few hours, with or without steam.

Synthetic Rubber-like Products

The development of synthetic rubbers and rubber-like materials which may not properly be termed rubber, is proceeding very rapidly, and extended commercial applications are in hand. This year work has been largely devoted to increasing the knowledge available with reference to the handling and compounding of these new raw materials, together with investigations into the special properties of compounded products from them.

The German "Buna" types of synthetic rubber, one of which is now available on the English market, are attracting considerable interest. Four grades are actually being produced by different methods and degrees of polymerisation, the object being to produce rubbers designed to meet specific conditions. Thus Buna N is designed for oil resistance primarily and this type is now generaly available.

The sulphur-containing synthetics are not strictly synthetic rubbers, but they are valuable raw materials for the production of oil-resisting products and are being used in this con-

nection, particularly in hoses. Neoprene, a chloro-derivative, is also being extensively used, and reference should be made to an excellent book, published this year by W. J. S. Naunton dealing with the production and properties of this material and the sulphur-type synthetics. As a result of work on the comparative oil resistance of rubber and Neoprene, S. Kambara has suggested[18] that assuming $(C_5H_8)_8$ and $(C_4H_5Cl)_8$ for the molecular magnitude of rubber and Neoprene respectively, Debye's formula, applied to the characteristics of their respective solutions, indicates that the molecular polymerisation of Neoprene is much greater than that of crude natural rubber, which may account for the greater oil resistance of the former. Particular reference to the workability of Neoprene and sulphur type synthetics, and the oil resistance of compounds produced from them, is made in a paper by T. L. Garner and J. G. Robinson.[19] The possibility of danger in an oil system through extracted sulphur compounds is referred to.

Compounding Ingredients

In the mastication of raw rubber any method to reduce the time required to produce sufficiently plastic material is welcome. Recent suggestions are to use organic peroxides, for example, acetone peroxide, incorporated on the mill during mastication, thereby appreciably facilitating the masticating process.[20]

An improved form of rubber substitute, more resistant to the action of alkali than a common rubber substitute, is stated[21] to be produced from acids, such as thioelaidic, $C_{18}H_{34}O_2S$; it is formed as a pale yellow, crumb-like mass, which is insoluble in ordinary organic solvents.

New softeners for rubber, to assist processing, are rarely put forward, and the evaluation of such materials is a difficult matter, especially if no specific application is in mind. Many investigators have attempted comparisons between the various types available, and quite recently[22] it was concluded that no general recommendation was possible as regards the superiority of one type of softener over another, particularly as regards their dispersing effect on rubber compounds. Also there is no relation between the dispersing effect and the softening action.

Excellent reinforcing properties are claimed[23] for a new rubber reinforcing agent, prepared by heating an aqueous solution of an alkali zincate with $Mg(HCO_3)_2$. The resulting finely divided precipitate of magnesium and zinc oxides partially carbonated (in the proportions of one molecule of each constituent), is separated, washed and dried without materially affecting its colloidal nature. It is claimed that this ingredient does not interfere materially with the colour of the mixings in which it is incorporated. This question of transparency in rubber mixings is of importance, and the value of Japanese precipitated magnesium carbonate for this purpose is widely recognised. The Japanese type has less reinforcing action than others, but its transparency in rubber mixings is not due to its special amorphous character.[24] X-ray examination only revealed a possible greater particle size due to a complex containing $6H_2O$ to each $5MgO,4CO_2$, compared with American precipitated carbonate with $9H_2O$. The suggestion made is that the greater transparency is due to reaction with the diffracting constituents of the rubber mix rendering them soluble. On the other hand, the reinforcing effect of the American product is attributed to its surface character and smaller particle size, and also to its possible formation of bridge linkages in the molecular structure of the rubber.

New Accelerators

The interest shown in the development of new derivatives of the thiazoles is accounted for by the universal popularity of mercaptobenzthiazole as an organic accelerator of vulcanisation. One investigator alone has studied some 45 various derivatives[24] and their effects in rubber mixings in an attempt to find new accelerators with special properties, particularly those showing little or no tendency to scorching. The presence of $-CO-$, $-NH-$, $-NO_2$, $-OH$, $-S-$, or $-Cl$ in the substituent was found to be favourable to accelerating power, while $-CH_2.CONH-$, $-CH_2.CO.O-$, $CH_2.Ph.-$, $-C_{10}H_7.CH_2$, and alkyl groups tended to give non-accelerating derivatives. Further, the position of any substituent group and also the character of other groups present influenced the accelerating effect. The above is typical of much of the work which has been done resulting in patents on new derivatives of the thiazoles.

A possibility of a whole range of new accelerators similar to the above, but derived from mercaptobenselenazole is envisaged through the publication of a new patent[25] proposing the use of this material and its derivatives as vulcanisation accelerators.

The delayed action type of accelerator is represented by a patent[26] claiming the use of condensation products from an aldehyde, a primary amine, and an alkylene polyamine, while in another process[27] for accelerator production an aldehyde derivative of a Schiff's base, obtained by the action of $1\frac{1}{2}$ to 4 molecules of an aliphatic aldehyde, with 1 molecule of a primary aromatic amine, is treated with carbon bisulphide.

Two-accelerated effects in rubber mixings at one time was a very popular field of investigation, and some work on these lines is still carried out. A new development, however, has arisen whereby two chemicals which may not be accelerators of vulcanisation in themselves, or which are not normally used as such, are employed in rubber mixings in order by their interaction to produce an accelerator of vulcanisation within the material to be vulcanised. In one case of this kind[28] an accelerator of vulcanisation is formed in the rubber by incorporating a compound of an aldehyde (not CH_2O) and a secondary amine (for example, piperidine) and treating the mixture with carbon disulphide in the presence of water. In another patent[29] normal salts of piperidine and pipecoline with carboxylic acids (such as oxalic, adipic, phthalic, fumaric, etc.) are used in admixture with dibenzthiazl disulphide. Such combinations are stated to give vulcanised rubber of high tensile strength and abrasion resistance, and a better resilience than is normally obtained from mixtures of mercaptobenzthiazole and organic salts of diphenylguanidine.

Non-staining antioxidants have for some years been a centre of activity in chemical research and interest does not appear to be diminishing. To give one of the new suggestions, which generally relate to very complex materials, it is claimed that condensation products of 1 : 3 : 2 –xylenol, formaldehyde, and a secondary base are satisfactory non-staining compounds for use as antioxidants.[30]

Improved means of resisting ageing and fatigue have also been suggested, the simultaneous use of three agents of the types (i) a catalytic oxidation inhibitor, (ii) an oxygen absorbent to eliminate oxygen initially present in the stock, and (iii) an organic base to activate the second member of the three, being suggested in this connection.[31]

The above items can only be taken as instances from a very considerable amount of research which has been conducted during the period under review, as a result of which many new products have been suggested for commercial use.

Vulcanisation

Chemical work in this field has been carried out in connection with the combined sulphur content of hard rubber mixes. It has been shown that a rapid increase in the rate of fixation of sulphur occurs after 90 minutes at 141° for mixtures containing more than 20 per cent. of sulphur. With high values for the percentage of sulphur the vulcanisation coefficients greatly exceeded that calculated for a composition C_5H_8S.[32] Further "vulcanisation" after reaching a point of fixation of sulphur lead to a gradual loss of combined sulphur; the loss was greatest for mixtures containing 70 to 80 parts of sulphur to rubber 100.

The importance of rubber bonded to metal is increasing and various methods of securing good bonds have been proposed recently. In one, it is recommended to use as a bond-forming ingredient, an accelerator of the carbosulphhydryl polysulphide class ($(N.Me_2CS)_2S_2$, $(N.Me_2.CS)Zn$, etc.), and

also a vulcanisation—accelerating component, including zinc dust, which has substantially no activating effect on the above accelerator[33]. With light metals, it is suggested in one patent[34] to spray the metal with a thin layer of metallic iron.

Analysis

In the field of analytical methods the importance, in view of the commercial interest, of accurate determination of water soluble constituents of rubber is well recognised and, recently, improved methods have been put forward which overcome many objections to older processes.[35] An improved method for determining carbon black in rubber stocks has been proposed,[36] with the particular object of securing greater accuracy and speed of operation; the authors recommend the use of smaller samples with high carbon black stocks and the elimination of the usual preliminary extraction processes.

Another interesting suggestion may be referred to in concluding, and that is a new titration method for sulphur determination using a new indicator.[37] It is claimed that the process is much more rapid than the usual gravimetric processes and quite accurate. The oxidised sulphur is precipitated by means of barium chloride, and the excess barium back-titrated using tetrahydroxyquinone as indicator.

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Society of Public Analysts and other Analytical Chemists

A Year of Steady Progress

FOR this Society the year 1937 has been one of steady progress. The membership has grown—it now stands at 823—and among the new members youth rightly claims a majority. The two most conspicuous activities of the society are its monthly meetings and its journal, *The Analyst*, and both are flourishing. As in 1936, a joint meeting with the Food Group of the Society of Chemical Industry has been held, at which a number of papers bearing on one particular subject, this time " The Less-known Constituents of Milk," were read and discussed. *The Analyst* has increased in size and circulation, and a notable feature has been the growing proportion of papers on inorganic analysis published in it. It is becoming increasingly recognised that all branches of chemical analysis come within the scope of the society. If evidence of this were needed it would be supplied by the Decennial Index of *The Analyst* (1926-1935) issued this year.

Of the less known activities of the society, the work of its committees and its representatives on other bodies should be mentioned. The Analytical Methods Committee and its Sub-Committees, for example, have continued their exacting work of finding the best procedure for the carrying out of various determinations. In the course of 1937 they have published authoritative methods for determining dirt in milk, esters in essential oils, and alkali and rosin in soaps. The society has also co-operated with the British Standards Institution in drawing up some of the specifications of this body.

The North of England and Scottish Sections of the Society have held meetings from time to time, at which a number of papers have been read and discussed, and in June a summer meeting of the North of England Section was held at Scarborough and attended by the president and members from all parts.

In even a very brief survey it seems fitting to record that the year now passing has deprived the society of one of its oldest and most honoured members, Dr. J. A. Voelcker, who maintained his active interest in the society to the end and was regarded with real affection by his co-members.

The British Association of Chemists

Progress During 1937

A FURTHER increase in membership is recorded by the British Association of Chemists, 116 new members having been admitted during the past year. Financially, the Association is in a very sound position, particularly the Unemployment Benefit Fund. The increased stability and security of employment is reflected in the low payments made from the fund during the year. Active steps are being taken with a view to operating the Government's Scheme which, when effected, would result in the chemists concerned being paid insurance by cheque from the B.A.C. Extended and increased rates of benefit from the Fund make it an attractive proposition, well meriting the support of all chemists. This will be an undoubted step forward when the salary limit is increased to £400 per annum.

Of interest to those graduating from Universities, and seeking employment, is the fact that the Appointments Service found posts for 100 members during the year. The Legal Aid Department has successfully recovered large sums of money as salary in lieu of notice for members. Recourse to the Courts has not been necessary. Officials of the Association have given evidence on this point on behalf of chemists not members of the B.A.C., and in each case the principle of 3 months' notice has been upheld. Active steps have been taken by the Association to keep the Home Office acquainted with the real position of chemists under the Poisons Rules, and valuable work has been done in this respect. The Council decided that a certificate of membership shall be issued to members indicating that they are fully qualified chemists and have been admitted and that their names have been entered in the Register. The Register is in preparation and will shortly be issued. Of the Association's members 95 per cent. are actively engaged in industry. The Register will form a comprehensive guide to those engaged in the industries for Government Departments and others.

PRODUCTION of synthetic acetic acid and its derivatives is under consideration by Denki Kagaku Kogyo K.K.

Association of British Chemical Manufacturers

Tariff and Safety Activities

DURING 1937 the Association of British Chemical Manufacturers has maintained its friendly relations with the Import Duties Advisory Committee. Oxalic acid, which was not only temporarily exempted from Key Industry Duty, but also from the 10 per cent. *ad valorem* duty under the Import Duties Act, was restored to its full Key Industry Duty as from the end of 1936 consequent on its manufacture being commenced in this country. Two further organic dyestuffs intermediates, namely, Naphthol AS-DB and Fast Brown V Base were added to the Free List by agreement between the makers and users.

An entirely new type of provision of great importance is included in Article 12 of the Ottawa Treaty which provides means for dealing with the dumping of Canadian goods in this country to the detriment of the British manufacturer. While it does not go so far in the way of positive action as was recommended by the Federation of British Industries and the Association, it nevertheless constitutes an important step forward.

An investigation was made to ascertain the reasons why the British chemical trade with Poland declined both on an absolute and on a percentage basis in 1936, as compared with 1935, while the German chemical trade has increased substantially in both respects. Discussions took place with the Polish Union of Chemical Industries, from which it appeared that difficulties associated with the Polish licensing and quota system have had an important effect.

Safety Activities

The Works Technical Committee has also continued active during the year. It has not only dealt with the Factories Bill, but it has supervised the routine safety activities of the Association, and handled a number of important matters relating thereto. The first of the tests for the detection of toxic gases in industry (hydrogen sulphide) was published by the Department of Scientific and Industrial Research through the Stationery Office in June, 1937. An investigation into the testing of respirator containers for industrial use indicated that it may be possible to lay down a single test with a selected vapour, which will assess the efficiency of a given charcoal against practically all the gases and vapours likely to be met with in practice, with a few specified exceptions.

Following on the conference on the subject of solvents held in 1936, the Works Technical Committee urged upon the Chief Inspector of Factories that the best method of reducing accidents arising from the industrial use of solvents was by the education of the users as to the dangers and necessary precautions rather than by prohibiting the use of certain materials. In co-operation with the Home Office, a short non-technical cautionary leaflet was drawn up, setting out in general terms the precautions desirable in the use of organic substances generally, and this has since been issued as Factory Form No. 297.

At the request of the Home Office, the Works Technical Committee revised Factory Form No. 814, on the cleaning of stills, tanks, etc., which have contained poisonous or inflammable materials.

The Ceramic Society

REVIEWING their activities for 1937 the Ceramic Society state that the Rules of the Society are being completely redrafted, but this matter is not yet sufficiently far advanced to merit a report. The recent meetings in London of the Refractory Materials and the Building Materials sections were the most successful the Society has had, particularly from the point of view of the quality of the papers presented. The annual banquet held on November 17 at the Piccadilly Hotel was also a complete success, a record number of more than 200 guests and members being present.

The Institute of the Plastics Industry

Main Activities during 1937

AS in previous years, the meetings of the Institute have been organised in three sections, being held in London, Birmingham and Manchester.

In London, last year's experiment was repeated in holding a meeting to discuss the applications of plastics to another industry. This year the other industry selected was the motor trade. The Midlands Section opened its session with a paper on "Technical Education and Apprenticeship in the Plastics Industry." In the Northern Section, all the papers read dealt purely with plastics.

A special feature was the Symposium which took place in January last in London. It was organised by the Institute as a whole, in conjunction with the Plastics Group of the Society of Chemical Industry. The meeting examined the position of the plastics industry in time of war and its potentialities as a national asset. The Symposium was favourably supported by representatives from all government departments and was attended by members of most of the learned societies. The nine papers were presented in groups of three, and the chairman of each group summarised the papers in his group. After a final summarising by the chairman of the Symposium, Mr. W. A. S. Calder, a resolution was passed requesting the British Plastics Federation, as the trade organisation of the industry, to take up the requisite matters arising out of the position disclosed by the papers.

During the year, the scheme for the award of certificates by the City and Guilds of London Institute was brought into full operation. Candidates entered from London, Birmingham and Manchester, and 24 certificates were awarded to those who passed. These certificates bear the endorsement of the Institute of the Plastics Industry and indicate a recognised standard of technical education.

Arrangements are being made also for the training of designers in plastics. British Industrial Plastics, Ltd. have donated a scholarship, known as the Kenneth Chance Scholarship for Art Designers, of an annual value of £150 to provide training for a selected student each year. The management of the scholarship is vested in the Council of the Institute.

Realising the need for a technical library of books and journals on plastics, the Council has established a library for the benefit of members. At present this is being worked on a postal basis.

At the annual general meeting, held on October 21, the retiring president, Sir Gilbert T. Morgan, O.B.E., D.Sc., F.R.S., gave his presidential address entitled, "The Trend of Research in Plastic Materials."

As well as dealing with educational and technical subjects, the institute has not neglected the social side. During February, the sixth annual dinner and dance of the institute was held at the Cafe Royal, Regent Street, London, W.1. There was a very large attendance of members and their friends. The guest of the evening was Mr. Foster Sproxton, then Chairman of the Plastics Group, Society of Chemical Industry. In addition to this "Institute" function, the London and District Section organised two dances at Thames House, while the Midlands Section organised an informal dinner and concert. Visits to various works were also organised by the sections.

ALUMINIUM vessels can be safely used for the storage of distilled water if internally coated with an Eloxal or M.B.V. layer. In the analytical laboratories of the Vereinigte Aluminium-Werke, at Lausitz, distilled water is regularly prepared in aluminium plant, the parts coming into contact with water being coated with an M.B.V. film. (*Chem. Zeitung*, December 1, 1937, p. 944). Methods of applying the protective coatings are described in the Aluminium Taschenbuch, issued by the Aluminium-Zentrale G.m.b.H., Literarisches Büro, Potsdamerstrasse (23a) 56, Berlin W.9.

A Review of Production and Technical Progress in the Plastics Industry

By
HARRY BARRON, Ph.D., B.Sc., A.I.C., A.I.R.I.

IT goes without saying that plastics have had a record year. Irrespective of business trends in other industries, there is no indication of any recession in the ever-expanding applications of plastic materials.

Their uses have spread to so many industries, that there is a basis wide enough to ensure stability and continued prosperity. The expansion is universal and almost every country with any pretensions to civilisation now has some sort of plastics industry. Available statistics give some indication of their remarkable rate of growth. Outside the United States it is rare to find detailed statistics relating to plastics. Since the United States is by far and away the largest plastics manufacturer and consumer in the world, their figures give a good indication of the trend of progress. The following statistics show this :—

	1935.	1936.
Phenol-Formaldehyde	95,160	47,300,000
Moulded	35,000,000	52,000,000
Laminated	10,000,000	17,000,000
Cast	4,750,000	5,800,000
Varnish	2,000,000	6,000,000
Miscellaneous	4,000,000	6,500,000
Urea-Formaldehyde	6,200,000	7,000,000
Glyptal	12,000,000	34,300,000
Cellulose Acetate	10,732,000	13,265,000
Nitrocellulose	16,205,000	20,540,000
Vinyl Resins	1,000,000	2,000,000

It is certain that the figures for 1937 will exceed by a considerable margin those for the previous year. Without definite evidence, it is generally accepted that Germany is the second largest plastics country, while Great Britain is third. Of course it is well known that in Germany, the production of synthetic materials is now part of the national creed. The official stimulus given to the elimination of standard raw materials by the use of synthetic products, has undoubtedly fostered their plastics industry, especially so far as newer synthetic resins are concerned.

Production Figures for this Country

In Great Britain this year for the first time, plastics have been accorded official status in trade statistics. According to the Board of Trade Journal Report, No. 16, the following quantities have been handled in this country in recent years :

	1933.	1934.	1935.
Synthetic Resins	163,800	228,200	364,300
Casein, Celluloid, etc.	88,900	100,800	93,900
Cellulose Acetate Plastics		5,000	6,700

The figures for the current year will show a very large increase over these. It is estimated, at present, that phenol-formaldehyde resins are being consumed at the rate of 20,000 tons per year.

Considering Great Britain in relation to the rest of the world, we more than hold our own in the standard synthetic resins and cellulose plastics. So far as newer synthetic materials are concerned, with the possible exception of acrylic resins, we lag far behind the United States and Germany—a deplorable state of affairs.

Events of the Year

At the beginning of the year, a Symposium was held in London to discuss the question of the raw materials of the Plastics Industry in the event of a national emergency. The interest which this aroused was astonishing, and an almost certain pointer to the enthusiasm of the people concerned with plastics in this country. For, on what was probably the worst day of the year, a very large hall was crammed tight for many hours, while these raw materials were being discussed.

Surprising to many people were the moulded products made from bitumens, examples of which were exhibited. Even the experts seemed to have forgotten that bitumen was the oldest plastic of all, being unquestionably the outstanding plastics in the heyday of Babylon.

In so far as it offered an excellent summary of the raw material position, the Symposium was more than justified. There was a somewhat heated argument concerning the merits and demerits of cresylic acids obtained from low temperature carbonisation of coal as a raw material for phenol-formaldehyde moulding powders. The fact that stood out from the discussion was the necessity for definite information concerning these materials. Especially is this the case in view of the fact that very large quantities will soon be available from yet another low temperature carbonisation plant to be opened in 1938 in South Wales. Another feature was the unanimous condemnation of the hydrocarbon tax (8d. per gallon), with particular reference to the production of synthetic camphor. This is definitely a sore point to those concerned with nitrocellulose plastics.

During the year great advances have been made in the design of plastic products. It has been realised that the beautiful materials available deserve special treatment, and that well designed products have a great appeal to the public. The Society of Industrial Designers has organised a special section to deal solely with the plastics industry. This is one of the most interesting trends at the present time.

Technical Developments

Synthetic Resins.—There is no stopping the advance of phenol-formaldehyde resins. The most important section of the plastics industry continues to expand at a remarkable rate. The ever-increasing quantities demanded have caused some anxiety regarding supplies of phenol. During the year there has been a steady rise in price Larger quantities of cresylic acids are being used, particularly in the production of resins for laminated materials. Possibly when the properties of low temperature carbonisation cresylic acids have been standardised, these may alleviate any tightness in the phenol position.

Almost every large manufacturing concern in the country now has some interest in phenol-formaldehyde resins, either for process work or for packaging. In many cases these concerns have instituted their own moulding shops. Although activities such as these substantially increase the scope of the resins, there is another more ominous aspect. Frequently, where production capacity is too great for internal requirements, general moulding is carried out. This foreshadows intensified competition in the future.

This year has seen the introduction of transparent phenol-formaldehyde mouldings. Already very popular in the United States they are beginning to make headway in this country. They are said to have electrical properties second only to the polystyrenes. A feature of outstanding importance regarding which not very much has been heard as yet, is a continuous process for making these resins in contrast to the customary batch method. The use of steel band conveyors enables this to be carried out.

Laminated materials are steadily gaining favour. Excellent work has been carried out by de Brune in the production of reinforced laminated materials for aviation purposes, by the impregnation of cord. In other directions laminated sheet

finds increasing popularity for engineering as gears and bearings, for interior decoration as panels, and for furniture as veneers. The impregnation of wood with phenol-formaldehyde resins has been brought nearer to a commercial basis by the United States Forest Department. They form the resin in the wood.

Resistance to Corrosion

The remarkable resistance of these resins to corrosion and chemical attack has made them popular for chemical engineering purposes. They are finding application for anti-corrosion linings in vats and tanks not only for chemicals, but for foodstuffs and beverages. The use of phenol-formaldehyde resins, suitably modified, as a basis for paints and varnishes, has expanded considerably during the year. The paint industry is one of the largest consumers of these resins. The increasing use of moulded parts in motor cars has been most noticeable. Four British cars now have phenol-formaldehyde mouldings as standard parts. Indeed, it is said that one type of small car contains about 10 lb. of plastics. It will be interesting to see whether this example will be followed.

During the year, the production of cast resins from phenol-formaldehyde has flourished exceedingly. These have achieved great popularity and their use is extending rapidly particularly for decorative articles.

Urea-Formaldehyde.—There has been a steady growth in the use of urea-formaldehyde resins and here again spread over a vast miscellany of applications. Perhaps the outstanding development of the year has been the production of transparent materials to give even more beautiful products.

These resins have proved remarkably attractive to the textile industry whose members have been very active in utilising them for the production of non-creasing textiles. The use of different condensing agents, notably zinc chloride, has resulted in the production of resins possessing desirable adhesive properties particularly for plywood production.

Applications of Glyptal Resins

Although comparatively little has been heard about the glyptal resins, there is no doubt that they are making great progress. In the United States, from the point of view of quantity, they show the most spectacular advance of any plastic. I think it is true to state that comparable development has taken place in this country. Having relatively little application for moulding, glyptal resins are chiefly used for synthetic finishes in the paint industry. They are coming into strong favour for painting motor cars and many examples are already apparent on our roads. Ease of application and the short drying time required afford great advantages over the cellulose lacquers in this field.

Cellulose Plastics.—Cellulose acetate has now almost caught up with nitrocellulose as a plastic. Owing to its relative incombustibility it has come to be described as non-inflammable celluloid. Its growth has been greatly assisted by the growing popularity of injection moulding. This has become evident by the appearance of a number of different makes of machine for this process. As the chief injection material, cellulose acetate has naturally benefited by this expansion. Other fields in which this plastic has gained ground, during the year, are for the sandwich layer in safety-glass, as sheets for display and advertising purposes and as a substitute for glass in aviation. In the United States, cellulose acetate mouldings are extensively used as standard parts in cars. An outstanding application is for steering wheels. We have yet to see this innovation in Great Britain. In view of the expansion in the use of cellulose acetate it is surprising to find that nitrocellulose plastics, particularly celluloid, still hold their markets.

Plastics derived from cellulose ethers, such as ethyl cellulose and benzyl cellulose, although having a number of properties to commend their use, are making very slow headway here.

It is noteworthy that during the year an enormous plant, said to cost £250,000, has been erected in Somerset to produce a popular type of transparent cellulose film.

The production of plastics from casein has not progressed at a rate comparable with other plastics. No startling developments have occurred. In the meantime competitive materials have gained ground steadily. Even the button trade, at one time almost the monopoly of casein, has been invaded by cast and moulded phenolic and urea resins. The great disadvantage of casein, its tendency to take up water even after being formalised, has not yet been overcome. The other important natural plastic, shellac, has been the subject of intensive research work to bring it to a competitive basis with synthetic resins.

Newer Synthetic Resins

Outside Great Britain there has been much activity in the products of synthetic resins such as polystyrenes, polyvinyl compounds, acrylic and methacrylic resins. Most of these products derive directly or indirectly from acetylene. For example, Germany is stated to consume about 120,000 tons of calcium carbide for synthetic organic products alone. This compares with the total of 50,000 tons consumed by Great Britain for all purposes. Largely as a result of this, the plastics shown at the Leipzig Fair and Achema made the plastics display at Olympia appear elementary.

The Germans and the Americans have developed a remarkable range of products by co-polymerisation and inter-polymerisation of vinyl derivatives, yielding products with a remarkable range of properties. The result is the appearance of a host of new names and types of plastic in Germany and the United States, which are curiosities here.

Fairly considerable quantities of styrene derivatives are used in this country for electrical purposes and it would seem that materials of this type are going to play a vital part in the development of television. It is not yet a domestic product. The production of synthetic glass from methacrylic resins and acrylic resins is one of the outstanding developments of recent years. This is an activity which is being carried out in Great Britain and is making great strides, particularly in aviation. A new field which has opened up during this year is in the production of optical lenses.

The most hopeful event of the year for the British Plastics Industry, in my opinion, has been the decision to erect a plant for manufacturing calcium carbide, at Port Talbot in South Wales. This may help us to catch up in the production of the newer synthetic resins.

With the Compliments of the Season

We have much pleasure in acknowledging the receipt of a number of Christmas and New Year cards, calendars and diaries which have been sent by subscribers and advertisers. Several of these call for special mention. The cover of an attractive card sent by the Adelaide Chemical and Fertiliser Co., Ltd., is a reproduction in colour showing Captain Cook hoisting the British Flag on the "Great South Land" of Australia. A card from Head, Wrightson and Co., Ltd., contains a photograph of the Imperial Radio Station, Rugby. The twelve 820 ft. high masts at the station were designed, made and built by the company. The cover of Dr. and Mrs. Felix Singer's card was a reproduction of an original crayon drawing and the card from the Institute of Fuel depicted figures representing the electrical, gas, petroleum and coal industries drinking each other's health.

Among the diaries, the Staveley Coal and Iron Co. was, as in previous years, of useful vest pocket size with a refill for the second six months of the year. The wall calendar from Crofts (Engineers), Ltd., contained a separate sheet for each month illustrating some of the company's products. Venesta, Ltd., sent a refill for a desk diary with samples of Venesta metal foils, plain, coloured and patterned, inserted. The Government Soap Factory, Bangalore, has acquired an enviable reputation of sending most novel Christmas souvenirs. This year the souvenir takes the form of beautifully coloured wood carvings illustrating aspects of Mysore village life.

A Year of Progress in the Special Areas

Opportunities for 1938

By

JOHN BENN

As a director of "The Chemical Age" and allied journals, Mr. Benn has studied the Special Areas in relation to several trades. New factories have been visited in Wales, the North-East and Scotland, and many firms have been interviewed.

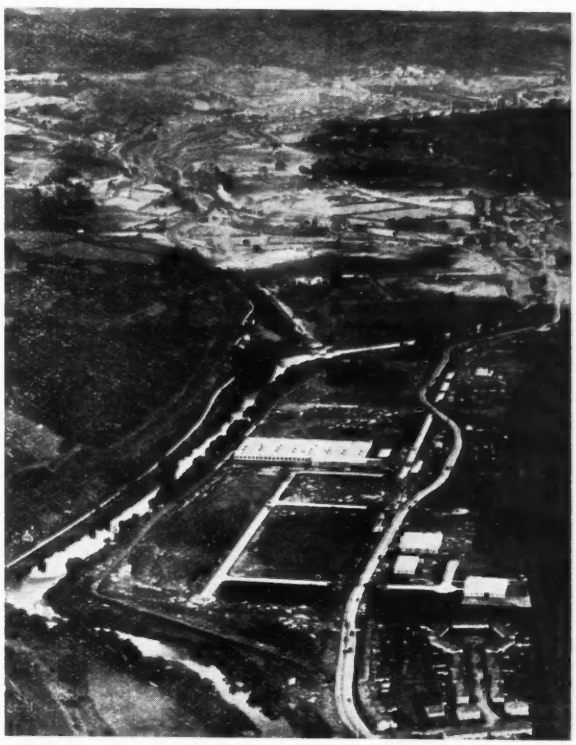
THE year 1937 has seen greater progress in the Special Areas than any year since they were defined by Parliament in 1934. Not only have the schemes of the first Commissioner (Sir Malcolm Stewart) matured—in particular the Trading Estates—but an amending Bill passed last May has provided assistance for the first time to enterprises "operating for gain," *i.e.*, normal business. In the past few months the new Commissioner, Sir George Gillett, has amply proved the value of this radical departure.

The need for further measures was brought to a head in November, 1936, by the Commissioner's statement that persuasion had "proved futile" in getting manufacturers to the Areas in sufficient numbers. He advocated unconventional measures in finance and a ban on new industries in the London area. The Government wisely accepted the first suggestion, and equally wisely referred the second to a Royal Commission—a time-honoured device for delaying action on a thorny problem. (I shall return to this later in the article.) What is now wanted, to quote Sir George Gillett, is "twelve months of steady work . . . with the powers already granted." Success may be predicted on at least two grounds.

Grounds for Success

In the first place, the Trading Estates near Newcastle and Cardiff are now in full swing, while another estate has been opened near Glasgow. Eighteen months ago the Team Valley and Treforest were still virgin soil, and the energies of the managers have, until recently, been occupied with the layout of the estates, road making, railway sidings, etc. Yet in spite of this, seventy-three factories are already let at the Team Valley—one per week since work began—while sixteen are under construction at Treforest. The Hillington Estate holds the record so far with forty bookings in six months. Every new enterprise attracts others, so that future growth should be progressive.

The second ground for optimism concerns finance. Under the new Bill the Commissioner may build and let factories, not only in the Trading Estates, but anywhere in the Special Areas; he can make grants towards rent, rates, income tax, and even towards the National Defence Contribution. His report, published last month, reveals that up to September 30 four factories in South Wales, one in the north-east, and one in Cumberland were arranged for under these new powers, while thirty-five loans had been made to new businesses and thirty-two loans to existing concerns, affording estimated employment for 6,800 workers. Loans from the Special Areas Reconstruction Association ("S.A.R.A.") and the Treasury have been supplemented by the Nuffield Trustees, who at the same date had assisted forty-three concerns to the extent of £1,346,000, employing another 4,000 men.



As one of those who drew attention to the need for financial inducements to private industry, and as an early critic of "S.A.R.A.," I gladly endorse the Commissioner's statement that "complaints of delay and unwillingness to accept risks are no longer justified." Whether he is right in calling such criticism "misguided" is another matter, for even allowing for the novel risks involved, the official agencies were undoubtedly slow in getting off the mark.

From this brief picture of progress during 1937 it will be seen that ample facilities exist to encourage new enterprise. Yet as 200,000 insured workers are still without jobs in the Special Areas, where unemployment averages 22 per cent., compared with 10 per cent. for the country as a whole, there is clearly a long way to go. The impression that labour is "difficult" is now quite false; five minutes' talk with the miners in Wales or Durham shows that the bitterness which blighted the coal trade in 1926 has given way to an intense desire for work. Hundreds of able-bodied men now know the misery of having nothing to do—a misery that no doles or relief can cure; and even the young lads whose independence has been sapped are quick to respond to employment. When a leather factory was recently opened in the north, several men walked thirty miles to apply for work. I believe that, to-day, the men cannot unaided do more to help themselves to cure their plight.

Need for Publicity

I am also of opinion that the Government has gone far enough to assist private enterprise, except in publicity. Manufacturers as a whole are not yet aware of the facilities available; the Commissioner's excellent booklet entitled "New Fields for Industry" needs backing up with widespread advertising in the Press, and with posters, broadcasting, the cinema, and all the other devices of modern publicity.

What, then, remains to be done? What are the most promising methods to complete the recovery of the areas?

I imagine that the nationalisation of industry, advocated as a "cure-all" by the Opposition, need not be discussed in THE CHEMICAL AGE. Englishmen, whether masters or men, are

Above: A view from the air of the Treforest Trading Estate in South Wales in course of construction. Beyond, in the sunlight, Pontypridd and the entrance to the mining valleys can be seen.

not in the least likely to submit to wholesale compulsion, and from an economic standpoint the largest contribution to recovery has been made by small firms in the light industries. Vast enterprises like the Ebbw Vale steel works are immensely valuable, but are not, in my view, the main hope of the areas for the future. Similarly, while a programme of public works would afford temporary employment, economists appear to be agreed that this should be deferred at least until rearmament is complete.

Suggested Compulsory Location of Industry

Another solution widely canvassed at the moment is the compulsory location of industry. The present choice of a site depends largely on local services—housing, roads, drainage, power, schools, etc. Where these are available a new factory can easily be accommodated, hence the tendency for existing centres to expand. But there are many towns and villages in the Special Areas with excellent services, but little employment, due to a decline in the single industry (*e.g.*, coal) on which they were built up. Such places afford first-class sites for new industries, whose promoters have the advantage of being in a position to command supplies, instead of having to go cap-in-hand to the various authorities. If this factor can be made widely known, I believe it will prove one of the natural magnets which should render compulsion unnecessary. The Commissioner's method of offering attractions (*e.g.*, factories for rent only) is more in keeping with British traditions than compulsion, and already he is using his powers of remitting rates and taxes on a basis that favours the placing of factories where unemployment is highest.

Yet another remedy proposed for the Special Areas is the establishment of State factories. This course has already been adopted for certain armament works, the latest being the calcium carbide plants for South Wales and Scotland. But it was shown before the Royal Commission on Arms Manufacture that the placing of orders with private firms, mainly engaged in the production of peace-time products, was the more economical way of maintaining an arms industry capable of quick expansion in time of war. Any extension of State trading to other industries would create the impression that private endeavour was no longer needed in the special areas. This would be a disaster, as the greatest need, taking a long view, is the establishment of as many new industries as possible on a self-supporting basis.

This brings me to what is, I believe, the crux of the problem. With some notable exceptions, very few industrialists have taken the trouble even to visit the areas to see the position at first hand. The special areas badly need a business crusade. Without the skilled judgment which manufacturers alone can form on the prospects for particular industries, the Government agencies are to a large extent powerless. As an executive of the Team Valley Estate said to me recently: "We are here to build a factory for any manufacturer who gives us instructions," but neither the estate companies nor the Commissioner can themselves engage in trade. The next step, in fact, rests entirely with the business classes.

A Great Opportunity

There is a great opportunity. The columns of this journal have afforded ample evidence that a commercial success can be made in a distressed or semi-distressed area by firms in the chemical and allied trades. One of the largest ventures may well be that of the new oil-from-coal plant to be erected at Wern Tarw Colliery, Pencoed, near Bridgend, by the South Wales Coalite Co. The Earl of Dunraven laid the foundation stone of this new enterprise on December 16 (cf. THE CHEMICAL AGE 1937, *37*, 489,537). It is estimated that the two collieries, supplying the coal for carbonisation, and the new works will give employment to several thousand men. Many more such enterprises are needed.

I realise that every manufacturer has his own problems—even publishers are not exempt!—yet a round of golf on weekdays is fairly common, and a visit to Durham or South Wales need occupy only thirty-two hours. I can promise intense satisfaction from exploring a new neighbourhood, examining possibilities, and perhaps eventually finding employment for a number of men, for apart from the thrill which a new project always affords, there is the knowledge that you are doing a national service of the first importance.

The Most Progressive Industry Alive

An American View of the Characteristics of the Chemical Industry

AN interesting article in the December issue of *Fortune* (U.S.A.) gives an account of the history of the chemical industry in America, its present-day composition and status, and the qualities which go to make it perhaps the most progressive industry alive.

The account opens with the "inside" story of the discovery of the application of fluorinated hydrocarbons as refrigerants, by T. Midgley. The refrigerants in general use were either toxic or inflammable, and it was clear that there would be an instant demand for a refrigerant of both non-toxic and non-inflammable properties. Midgley and his associates commenced work by searching the International Critical Tables for such a substance boiling between 0 and −40° C. The most helpful thing that they found in the tables was a mistake. The tables listed carbon tetrafluoride as boiling at −15° C., and there were good reasons for thinking that this was wrong, as it later proved to be. This started a train of thought on the organic compounds of fluorine. Turning to the table of elements arranged according to Langmuir's theories of atomic structure, Midgley saw at once that there were eight elements known to make sufficiently volatile, stable compounds, and that all the refrigerants known so far were made from among these elements. But there was one element, and only one, fluorine, that had never been so used. He then decided to synthesise dichlorodifluoro-methane which was said to boil at −20° C., but whose other properties were entirely unknown. This was done successfully, starting with antimony trifluoride, and the product was found to be non-inflammable and completely non-toxic. The whole work from start to finish lasted three days. Dichlorodifluoro-methane, previously an obscure material, is now supplied in tons.

The writer of the article quotes this work as a token of the chemical industry. It is considered that the industry was first begun by Leblanc. He was the first person on record to set out to make something into something else for a practical end, with deliberate intention, and by scientific means, with his eye not only on chemistry but on economics. Upon this rests the entire structure of modern chemical industry. The first characteristic of the industry is its extreme youth—chemically, it dates from Leblanc and 1791; industrially, it dates from only after the world war. Its youth and its upbringing lend to the industry its second characteristics: it is as progressive an industry as it is possible to imagine. It is constantly questioning its own fundamentals. The next characteristic to be noted is that it is an "orderly" industry. The basic reason for this is that the industry is not just an industry: it is also a profession. The necessity for high scientific training is one of the most important characteristics; at the same time the industry needs a minimum of labour. The writer of the article holds that the prime characteristic of chemical industry is the extraordinary proliferation of its products. It is all but impossible for one process to make only one product. Today the whole chemical picture has an air of financial stability that is unusual in so new an industry.

Promotion of Co-operative Research on Wool

Work of the Wool Industries Research Association on the Development of New Processes

IT is encouraging to record that the faith in research possessed by members of the Association has now been shown in a very concrete form, states the report of the Director of Research to the Wool Industries Research Association, for 1936-37. Not only has a generous response been made by a number of individual firms for the purpose of meeting a serious and unexpected deficit in revenue, but the council has taken the important step of considerably increasing the rates of subscription in the processing sections of the industry. This recognition of the urgency of providing for research on a more adequate scale, together with the interest shown by representatives of overseas wool producers and their clearly expressed desire to promote co-operative research in the interests of wool, all combine to afford a more hopeful prospect for greater usefulness in the future.

It is not sufficiently recognised by many industrial firms (especially when business activity is high) that a research organisation cannot be expected to produce revolutionary changes in processes without a willingness on the part of the industrialist to experiment. "Teething" troubles, however, invariably accompany the translation of a process from the semi-large scale of experiment to commercial production.

Shrinkage-Resistant Wool

This attitude is felt to afford a partial explanation of the slowness with which the Association's "unshrinkable process" is being taken up. Another reason is that a new patented process has been announced during the year which presents certain apparently attractive features to the "finishing" section of the industry. In addition to the production of a desired degree of shrinkage resistance, it is of importance that a successful process shall cause no marked deterioration in "handle" of the treated wool. Such deterioration is due to lack of uniformity in the reaction which produces some fibres much more strongly treated than others.

There is good reason to believe that the seat of the reaction is the same, whatever reagent is employed to produce effective non-felting properties in treated wool. It is quite erroneous to suppose, as is suggested in trade literature recently appearing, that there is any necessarily more deleterious action on the wool in the employment of chlorination, either by "wet" or "dry" processes than by reagents which produce the same effects in other ways. Provided uniformity of action can be ensured, the relative advantages of competing processes will be determined by convenience, accuracy of control, and by the costs of the treatment. Cost must, of course, depend on the scale on which the process is carried out.

During the year a technical paper has been issued which describes methods by which this uniformity of modification of wool can be measured and related with its behaviour on milling. It is thought that the methods will prove of considerable value in the control of the effects of processing, no matter what reagent is employed.

A Study of Wool Bleaching

If it is necessary to admit that unshrinkable treatments are at present based on empirical knowledge, it must equally be confessed that no precise and consistent chemical explanation can be given for many other of the processes used in the industry. This is certainly the case with the reactions which underlie the bleaching process. Recent work has shown that both in sulphur stoving and in treatment with bisulphite solutions, complex reactions take place involving the disulphide link which is a dominating influence in the chemistry of keratin.

It must be recognised that the effects produced are not limited to the removal of extraneous colour or the inactivation of chemical grouping present in the substance of the wool itself. Although both these aims are of importance it has become evident that the latter is functionally concerned with the disulphide link, indeed, a permanent bleach necessitates a transformation (rearrangement) of this link. With this transformation, it is to be expected that some change in mechanical properties of the fibre will be produced. Understanding of these processes will explain the springy handle which is one of the desiderata of sulphur-stoved hosiery finishes on the one hand, and the tendency to deadness which results from a peroxide bleach.

A technical paper has been issued during the year which deals with this subject and provides further information on the requisite conditions for the successful employment of the W.I.R.A. "permanent" wet sulphide bleach which was referred to last year.

Rubberising Wool

In discussing unshrinkability, it has been shown that in all probability, we are dealing with a specialised layer of cells which lie immediately between cortex and scales. In bleaching and setting, we have to do with the "bulk" chemistry of keratin. In another method of modification of the fibres, it is the surface with which we are concerned. It is well known that the amino-acid constituents of keratin confer on it the properties both of a base and of an acid. It is on this property that the wide facility of wool to take acid or basic dyes depends. The active groups at the surface of the wool fibre can be readily brought into play so as to form chemical attachments of materials other than dyes.

By utilising a class of compounds which can react at one end with wool, and which at the other end exert an affinity for other materials, it has been found possible to link on coherent films much in the manner of an adjective dyestuff. The added material which has so far been investigated is rubber, and patents have been taken out to cover the process.

It has been found possible to rubberise wool yarns in hank form by treatment with a suitably prepared latex without any matting. The wool may be dyed either before or after the treatment, or colour may be applied in the latex itself. It is thought that the process will have useful application in producing strong yarns with little twist, in the manufacture of felt, and in the production of permanent surface modification as, for instance, in providing water repellance, moth-proofing, and so on. A remarkable degree of increase in abrasion resistance is found to be another useful effect of the treatment.

The development and characteristics of "monofrax" refractories at the Mellon Institute, is described by Thompson (*Glass Ind.*, 1937, *18*, 11, 363-366, 385). The new refractories are designed to withstand the severest conditions met with in glass melting furnaces.

As the result of a considerable number of preliminary experiments, it was found that the most satisfactory base was alumina, in either the alpha or beta modifications. Mixtures of these oxides and various addition agents were then tested for resistance to corrosion by glass melts under practical conditions. From these tests a number of "preferred mixes" were selected, which contain, in general, 80 per cent. or over of alumina, the balance consisting in general of other oxides, the nature and amount of which depends on the service to which the refractory will be subjected. These mixtures can be cast at 3,300-3,800° F.

The new refractories present a very notable advance in the matter of corrosion resistance, lack of devitrifying and spalling tendencies, and non-contamination of the glass melts, over those at present in use.

Chemical Industry Wages

A New I.C.I. Code

IMPERIAL CHEMICAL INDUSTRIES, LTD., and 23 trade unions representing craftsmen of all classes, semi-skilled and general workers, have reached a new agreement which provides for an improved standard code of working conditions in all I.C.I. factories and works (except in the metal group) from January 3. About 37,000 workers will be affected. The agreement deals with working hours, meal times, overtime, abnormal time, night work rates, shift allowance, piece work prices, protection of wages on holiday, annual hoiday and service bonus.

More than 15,000 people will benefit immediately by the standard scheme which, under the agreement, will supersede all existing sectional service bonus schemes. The new bonus will be payable as a fixed weekly sum while the worker is on the company's pay-roll irrespective of absence, and will vary from 1s. a week after five years' aggregate service to 5s. a week after 25 years. No amount now being paid by way of service bonus under existing schemes will be reduced.

The Transport and General Workers' Union, the National Union of General and Municipal Workers, and the Mid-Cheshire Salt and Chemical Industries Allied Workers' Union have arrived at a further agreement with Imperial Chemical Industries providing for varying wage advances to general workers (except in the metal group). These affect 32,000 general workers and include 3s. 5d. a week to minimum rated day workers on plain time work; 2s. 5d. a week and upwards to other time workers; 1s. 6d. a week to women; proportionate increases to juveniles, male and female; and 5 per cent. to piece workers.

A trade union estimate is that the improvement in conditions will cost the firm £350,000 a year.

Some Chemical Centenaries for 1938

Perkin—Dulong—Tennant

MARCH 12, 1938, is the centenary of the birth of Sir William Henry Perkin, discoverer of the first aniline dyes. He laid the foundation of the coal-tar colour industry by the discovery of mauve (Perkin's purple) in 1856, and its subsequent production on a large scale. He was engaged in the manufacture of coal-tar colours until 1874, and was the first to prepare the perfume, coumarin, synthetically. He also made researches into the preparation of unsaturated acids and into isomerism.

Alexander Crum Brown, who became professor of chemistry at Edinburgh University, in 1869, and president of the Chemical Society of London, was junior to Sir William Perkin by two weeks.

Sir Thomas Stevenson, born on April 14, 1838, became Home Office analyst, president of the Institute of Chemistry, and a lecturer on chemistry at Guy's Hospital.

On July 18, 1938, Pierre Louis Dulong died. Dulong discovered nitrogen trichloride, and was an ardent supporter of the hydrogen ion theory of acids. His physical researches undertaken in conjunction with A. T. Petit culminated in the discovery of the law of atomic heats (the law of Dulong and Petit).

Charles Tennant, who patented a bleaching agent made by passing chlorine through a well agitated mixture of lime and water, died on October, 1838. He also took out a patent for a solid bleaching powder made by the action of chlorine on slaked lime. He was subsequently partner in a chemical works founded to manufacture bleaching powder and other alkali products.

Another celebrity who died in 1838 was Friedrich Accum, a Westphalian chemist, who played a great part in promoting the introduction of gas-lighting in England. His published works included "System of Chemistry," "Essay on Analysis of Minerals," and "Manual of Analytical Mineralogy."

Letter to the Editor

Sulphuric Acid from Saturator Gases

SIR,—In the article by Dr. G. E. Foxwell dealing with the heavy chemical industry in your Annual Review Number of December 25, some prominence has been given to the production of weak sulphuric acid from the effluent gas from an ammonium sulphate saturator by means of a modified chamber plant. Such a process was also mentioned by Mr. P. Parrish in a similar article published a year ago.

It seems very surprising that no reference has been made to the plant which has been put into operation during the year at one of the principal tar products works in this country for the production of high-strength sulphuric acid from saturator gases by the so-called "Wet Contact" process.

The essential features of the process itself, which has been described several times in the technical press, are the unaided combustion of gases containing very variable proportions of H_2S, the oxidation of the SO_2 in the resulting gases to SO_3 by means of a vanadium catalyst in the presence of all the water vapour introduced with the air and formed in the burning of the H_2S, and the direct condensation of sulphuric acid of 90 per cent. and over, and of battery quality, leaving an effluent gas whose acidity is well below the limits called for by the Alkali Inspectors. Heat interchange being unnecessary, controlled air cooling of the gases before and during their passage through the converter results in remarkably constant output, strength of acid, and efficiency of conversion.

The plant which was started up in this country during 1937 has been producing regularly the equivalent of more than 10 tons of monohydrate per day in the form of 90-92 per cent. acid. The overall efficiency has been not less than 95 per cent., even under difficult conditions caused by the use of saturator gases with a low content of H_2S.

For obvious reasons this development has caused a good deal of interest in technical circles, and we feel that mention of the plant should not have been omitted from an article which is intended to cover the developments in the field of heavy chemicals during the year.—Yours, etc.

H. J. BUSH.

Huntington, Heberlein and Co., Ltd.,
Bush House,
Aldwych, W.C.2.
December 29

The new factory for the manufacture of welding electrodes now under construction for Murex Welding Processes Ltd., at Waltham Cross, is to be one of the largest all-welded steel-frame structures of its type in the country. The welding throughout was carried out by the electric arc process, using Murex welding plant and "Ironex" electrodes. The welding of the light secondary girders was carried out on a 250-ft. jig, one of the girders being seen above in the jig after welding. The factory at present covers an area of 4½ acres in a rectangular block, 500 ft. by 375 ft., and provision is made for further extension in two directions.

Development of a Standard Hydrogenation Technique

Its Utilisation in Classifying Certain Coals

THE object of an investigation conducted by Petrick, Graigher, and Groenewoud of the Fuel Research Institute of South Africa (*J. Chem. Met. Min. Soc. S. Africa*, 1937, *38*, 122-144) was to develop a standard hydrogenation technique which was to be used in routine tests, the results of which would enable the Institute to classify South African coals from the hydrogenation point of view.

Comparative work on South African coal was conducted in a 5-litre rotary converter of the Bergius type. This converter was a bottle shaped, thick walled steel vessel which tapered into a shaft at the closed end and was provided with a flange at the open end. The converter head fitted into the mouth of the converter and was bolted down by means of six $\frac{3}{4}$ in. bolts, a soft copper ring between the flanges ensuring a gas-tight joint even at high pressures. A thermo-couple pocket, an outlet valve and a manometer were mounted on the head. The converter was heated in an insulated, gas-heated furnace in which it rested on rollers. It was driven by an electric motor via reduction gear to make approximately 30 r.p.m. In working out the technique to be adopted in the comparative work a number of factors had to be considered. One may mention:—1, the catalyst; 2, the pressure of hydrogen; 3, the rate of heating; 4, the reaction temperature; 5, the reaction time; 6, the pasting oil; and 7, the relative proportions of coal and pasting oil.

Reaction Conditions

It was decided to use a molybdenum catalyst (a mixture of ammonium molybdate and sulphur, both in powder form, being charged to the converter in sufficient quantities to give five per cent. by weight of MoS_2 during the reaction). The hydrogen pressure was fixed at 95-100 atmospheres initial pressure, and the rate of heating adopted was approximately 3.8°/min., *i.e.*, after an initial rapid heating to 200° the rate was about 4°/min. between 200 and 300° C., 3.5°/min. between 300 and 400° C. and 3°/min. from 400-500°. Some tests were conducted in order to determine whether a very slow rate of heating (approximately 1.5° min.) from 350° to the reaction temperature would be advantageous, but no material advantage was gained so that this procedure was not adopted.

The experimental work was thus devoted to the determination of suitable conditions with respect to: (*a*) the proportion of pasting oil to coal; (*b*) the pasting oil; (*c*) the reaction of temperature; and (*d*) the reaction time.

Hydrogenation Experiment.

Considering the variable (*a*) above it may be stated briefly, that when using heavy cresote oil as pasting oil a coal to oil ratio of 3:2 was found to give satisfactory results. When less oil was used, *e.g.*, ratio 3:1, the coal showed a tendency to coke on the walls of the converter. A ratio of 1:1 did not seem suitable, as the coal separated out very quickly so that the mixture was not homogeneous for charging unless it was stirred at the time. As a similar separation probably occurred in the converter there seemed no object of adding large quantities of oil to the coal. As regards the actual weight of the charge a mixture of 250 grams of coal and 167 grams of oil was found to give better results than mixtures containing 360 or 500 grams of coal.

Two important factors influencing the course of the hydrogenation experiment proper are the reaction temperature, and the time of reaction. Experiments were conducted at 370°, 400°, 420° and 450° in order to determine optimum conditions. 370° was too low to produce substantial quantities of oil. The results obtained in a few experiments at 420° were somewhat better than those obtained at 400°, but were not as good as those obtained at 450°. An extension of the time of reaction from one to two hours did not result in a very marked decrease in the amount of organic insoluble residue, although it may have affected the composition of other reaction products. It did therefore not seem necessary to keep the temperature constant for more than one hour in the routine test.

The following *technique* was adopted—250 grams of coal (30 mesh) and 167 grams of heavy tar oil and ammonium molybdate and sulphur powder (calculated to give 5 per cent. by weight of MoS_2) were intimately mixed and then charged to the converter. After adding a number of steel balls to act as stirrers the converter was closed and hydrogen was charged to an initial pressure of 100 atmospheres. The converter was placed in the furnace, and connected to the motor, and a thermocouple was placed in the thermocouple pocket. The motor was started and the gas burners were lighted. The converter was heated at approximately 3.8°/min. so as to reach a temperature of 450° C. within two hours. This temperature was kept constant for one hour and the converter was then allowed to cool.

Benzene insoluble residue in the hydrogenation product:

The product from the converter is transferred as completely as possible to a widenecked bottle or, if the oil appears to be very thin, to a retort. The converter is cleaned thoroughly with waste and the increase in the weight of waste is determined and added to the weight of product removed from the converter. Products containing a large proportion of volatile ("thin") oils are distilled so that about 30 per cent. of the product is removed (final temperature of distillation about 210°). The viscous hydrogenation product (or distillation residue) is thoroughly mixed and a sample taken as soon as the stirrer has been removed. From this sample 10 grams are weighed out into a 100 c.c. centrifuge tube, the sample being kept homogeneous all the time, and the surplus sample is poured back to the bulk of the product. This is again agitated and a second sample is taken, from which again 10 grams are weighed out in a second 100 c.c. centrifuge tube. The centrifuge tubes are now filled with benzene, the contents stirred if necessary, and the tubes spun in the centrifuge for 35 minutes. The oil-benzene mixture is then decanted off, fresh benzene is added and the sediment is stirred so as to mix it with the benzene. The tubes are again spun for 30 minutes. The liquid is decanted off and fresh benzene is added and the process is repeated another four times, the time of spinning being 15 minutes. After pouring off the benzene from the last washing the tubes are heated at 60° C. until constant weight is attained and the amount of sediment is determined. From the known weight of residue in the sample, the weight of hydrogenation product, the amount of catalyst and of coal used and the ash and moisture content of the coal, the organic benzene insoluble residue in percentage by weight of d.a.f. coal can be calculated.

Effect of Pasting Oil

No extensive work has been carried out on the effect of pasting oil in the present investigation. Heavy creosote oil has usually been used for the tests, but some experiments were done with lighter creosote oils. Similar results were obtained with the oils, the small differences lying well within the experimental error of such a determination.

It appears as if the treatment of coal with HCl at room temperature had a beneficial effect. The procedure was, however, somewhat tedious and was not included in the routine method. The results with a deposited catalyst did not show any definite improvement and the "standard" method of procedure was therefore not altered.

The most likely sources of South African coal for hydrogenation purposes were deduced. The results obtained in routine hydrogenation tests were quite good, although they were not as favourable as those obtained with European coals that are being used for hydrogenation purposes. All these coals have high ash contents judged by European standards.

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Personal Notes

MR. S. J. SAINT, assistant director of agriculture and chemist, Barbados, has become director of agriculture.

MR. RALPH C. CHAMPLIN has been elected a vice-president of the Ethyl Export Corporation, a foreign subsidiary of the Ethyl Gasoline Corporation, of New York.

MR. C. K. THOMPSON has been appointed analyst in the department of agriculture at King's College, Newcastle, in connection with work relating to the land fertility scheme.

MR. WILLIAM Y. PATERSON, of Tranent, a recent D.Sc. graduate from Edinburgh University, has been appointed a research chemist with the I.C.I. at Ardeer works, Ayrshire.

LORD MELCHETT is ill at his country home, Culworth House, Sharnbrook, Beds. He is confined to bed with an overstrained heart. It will be some weeks before he is able to fulfil any engagements.

MR. JAMES STEWART CALDWELL, of Philpstoun, West Lothian, a well-known shale oil mining official, son of the late Mr. James Caldwell, general manager of the Pumpherston Oil Co., left £6,560.

DR. F. HEATHCOAT, lecturer in chemistry and fuel technology at the College of Technology, Rotherham, has been appointed vice-principal and head of the chemistry department at the Technical College, Swansea.

MR. LOUIS FRANKLAND, of Mayfield, Holly Bank Road, Great Horton, Bradford, a director of Franklands, Ltd., warp dyers, Paddock Dyeworks, Clayton, has left estate valued at £49,643, with net personalty £45,491.

MR. F. S. WALKER, of Unilever House, London, has been appointed to succeed Mr. W. W. Watt, who left Lever Bros., Ltd., at the end of the year to become managing director of the British Oxygen Co., and to the board of Lever Bros. (Port Sunlight), Ltd.

MR. WILLIAM BLACK, managing director of the Charlestown Lime Co., Ltd., Dunfermline, was honoured at a dinner held in Dunfermline on December 23, to mark the completion of his jubilee in the lime trade. In the course of the evening, Mr. Black was presented with a settee and easy chairs, a bookcase and books, and a wallet of Treasury notes.

SIR WILLIAM ALEXANDER, Unionist Member for Glasgow Central, has told the Executive Committee of the Glasgow Central Unionist Association that he will retire at the next General Election. Sir William, who is 63, was first returned for Central Glasgow in 1923, after the death of Mr. Bonar Law, who had represented the constituency.

DR. FRANK J. TONE will be presented with the Perkin Medal of the Society of Chemical Industry at a joint meeting of the American Section of the Society of Chemical Industry and the American Chemical Society on January 7. The medal is awarded annually for the most valuable work in applied chemistry and has been awarded to Dr. Tone for his work in the field of abrasives and refractories.

DR. KARL E. MASON, of the Vanderbilt University School of Medicine, has received a grant of 500 dollars from the permanent Science Fund of the American Academy of Arts and Sciences, for assistance in work concerned with the standardisation of methods for the routine assay of food substances for vitamin E content. Professor Robert S. Harris, of the Massachusetts Institute of Technology, has been awarded a grant of 300 dollars for the purchase of mothers' milk in an investigation of the chemistry of the casein and the antirachitic properties of the milk.

OBITUARY

MR. ROBERT DOWNIE BUCHANAN, glue manufacturer, of Dumbarton and Linlithgow, died at Cragdene, Dumbarton, on December 26.

MR. WILLIAM E. MOODIE, for many years a director of the United Turkey Red Co., Ltd., Alexandria, Dumbartonshire, has died at Harrow.

MR. ALEXANDER J. DEY, M.P.S., for many years managing director of T. and H. Smith, Ltd., Blandford Chemical Works, Edinburgh, has died at his home, Rothiemay Corstorphine, Edinburgh, at the age of 69.

SIR BENJAMIN SANDS JOHNSON, chairman and joint managing director of Johnson Bros. (Dyers), Ltd., died at Liverpool on December 25. In 1919 he was appointed director-general of national factories under the Ministry of Munitions.

MR. JOHN COLLETT MOULDEN, a director of Barronia Metals, Ltd., the Tungsten Manufacturing Co., Ltd., and other metal companies, died just before Christmas at the age of 64. He was an associate of the Royal School of Mines and a member of the Institution of Mining and Metallurgy.

DR. CHARLES HERBERT LAWALL, who in 1931 was appointed United States representative on the League of Nations International Committee for assaying opium, died at Philadelphia early in December. He was a member of the Society of Public Analysts, London. For 33 years Dr. LaWall served as chemist to the Bureau of Foods and Chemistry of the Pennsylvania Department of Agriculture. At the time of his death he was Dean of the Philadelphia College of Pharmacy and Science.

Foreign Chemical Notes

Greece

PERMISSION TO ERECT A SUGAR FACTORY with an annual capacity of 6,000 to 8,000 tons has been granted. A French group is also planning the establishment of sugar factories at Salonika, Larissa and Phillipiades.

Sweden

ALKALI SULPHITES AND PHOSPHATES are to be produced in plants now under construction by the Reymersholms Gamla Industri A.-B. The range of products will include mono-, di- and trisodium phosphates and sodium metaphosphate.

Finland

MOLYBDENUM DEPOSITS HAVE BEEN LOCATED at Pielisjärvi by the Outokumpu Co.

SYNTHETIC RESIN PRODUCTS are to be made by the Akro O.Y., formed in Tampere, with a capital of 100,000 Finish marks.

Czechoslovakia

DENTAL CEMENTS ARE NOW BEING MADE by the Oderberg Chemical Works.

THE JULIUS, RUTGERS CONCERN, of Karlsbad, has now recommenced the production of montan wax.

NEW PLANT FOR THE PRODUCTION OF SOAP is being installed by the Richter Edible Fat Works, at Teplitz-Schönau.

Japan

PRODUCTION OF CARBON BISULPHIDE is to be started by the Fujikawa, Kagaku Kogyo K.K.

WITH A CAPITAL OF 5 MILLION YEN the Akita Sulphur Mines Co. (Akita Yuo Kogyo K.K.) has been formed to extract and refine sulphur.

POTASSIUM PERMANGANATE MANUFACTURE at the rate of about 2 tons per week has been commenced by the Okuno Seiyaku Sho of Osaka.

SYNTHETIC RUBBER MANUFACTURE HAS BEEN COMMENCED by Nippon Gosei Kagaku Kogyo K.K. (Japanese Synthetic Chemical Company).

FOLLOWING THE PROHIBITION OF CITRIC ACID IMPORTS, a doubling of its plant capacity for this acid has been decided upon by the Organic Acids Co (Yukisan Kogyo K.K.).

NON-FLAMMABLE CELLULOSE ACETATE will be produced at a new factory of the Dainippon Celluloid K.K., now under construction at Arai (Niijata Province) at a cost of 1 million yen.

From Week to Week

TURNER'S ASBESTOS CEMENT CO., are to build a new £250,000 plant in the Clyde area.

PRICES OF OERTLINGS BALANCES are now increased by 10 per cent., states a recent circular of A. Gallenkamp and Co., Ltd.

AN IMPROVEMENT SCHEME costing £38,000, is proposed at Perth Corporation Gas Works, including a benzol recovery plant (£3,000).

QUICKFIT AND QUARTZ, LTD., have issued a new catalogue of interchangeable laboratory glassware. Amended prices apply as from January 1, 1938.

ABOUT 4,000 WORKERS IN THE OIL WORKS and shale mines of Scottish Oils, Ltd., are to receive a wage increase of 6d. a day and a week's holiday with pay in the summer.

MONO PUMPS, LTD., announce that they have moved their head office to Clifton House, Euston Road, London, N.W.1, to which all communications should be sent. Their new telephone number is Euston 5432 (3 lines).

THE EFFECTS OF CHROME ON THE SKIN are described in an official cautionary notice issued by the Home Office (Form 398). Copies for posting up at chromium-plating works can be obtained from the Stationery Office, price 1d.

THE POWER HOUSE at the works of United Glass Bottle Manufacturers, Ltd., at St. Helens, Lancs., was wrecked by the explosion of an air compressor on December 22. The whole manufacturing process at the works was stopped.

THE KING WILL OPEN THE EMPIRE EXHIBITION at Bellahouston Park, Glasgow, on May 3. The Palace of Engineering, which covers five acres, is now complete, apart from the final decoration, and work on the other buildings is well under way.

IMPORTS OF MERCHANDISE INTO THE UNITED STATES during November amounted in value to $223,000,000, compared with $224,000,000 in October. Exports of merchandise during November reached $315,000,000, compared with $333,000,000 in October.

ALPHA CEMENT, LTD., announces that negotiations are now in progress which are expected to result in an offer by the Associated Portland Cement Manufacturers, Ltd., to acquire the whole of the 1,000,000 ordinary shares of Alpha Cement. The company has an issued capital of £1,642,000.

SUFFOLK IRON FOUNDRY (1920), LTD., have introduced a new welding rod for the low-temperature welding of cast iron. "Sifonil" is claimed to be the first rod of its kind to be produced in this country. Details of the process are given in a booklet which can be obtained on application.

FOR THE THIRD SUCCESSIVE MONTH Sheffield has created an all-time record in steel output. The November total of 160,400 tons which brought the aggregate for eleven months to 1,653,600 tons (an increase of 193,800 tons compared with the corresponding period of last year) is 18,200 tons more than November, 1936.

THE ANNUAL MEETING OF THE BRITISH ASSOCIATION will be held at Cambridge, August 17-24, 1938, under the presidency of Lord Rayleigh, F.R.S. Sectional presidents include: (Chemistry) Professor C. S. Gibson, F.R.S.; (Economics) Mr. R. F. Harrod; (Engineering) Professor R. V. Southwell, F.R.S.; and (Agriculture) Professor R. G. Stapledon.

FIRE BROKE OUT at Nobel's explosives factory, near Polmont on Christmas Eve, just before the day-shift workers were due to leave. The entire factory, employing close on 800 girl workers, was working on a Government order when a large quantity of tetryl chloride ignited in a shed not far from the magazine department. The works' fire brigade, with the assistance of the Falkirk Fire Brigade, attended.

A DECLARATION OF SOLVENCY HAS BEEN FILED relating to W. H. Wakefield and Co., Ltd. (a private company), which was registered on June 17, 1903, to acquire the business then carried on by W. H. Wakefield and Co., at Gatebeck, Westmorland, and Low Wood, Lancs., and to carry on the business of manufacturers of gunpowder, nitro-glycerine, dynamite, etc. Authorised capital is £75,000 in 7,500 shares of £10 each, all of which had been issued and fully paid up to April 19, 1937. At the date named I.C.I. (Explosives), Ltd., held 5,914 shares.

A NEW INDUSTRY IS TO BE ESTABLISHED at St. Helens, Lancashire. It will be conducted by the Lancashire Metal Sublimation Corporation, Ltd., the directors of which are Sir Hugo Rutherford, of Liverpool, Mr. L. Rutherford, and Messrs. H. Blackwell and Turner, of the British Thermite Company, and Mr. T. Wood. Arrangements have been made for the leasing of a site in St. Helens, formerly occupied by the works of the United Alkali Company. The company have patented a new idea for the production of special metal. They will begin with the production of magnesium on a commercial scale, and it is hoped that before long the products of the works will include aluminium, ferro-chrome, beryllium, zinc, and all metals that sublimate.

UNITED GLASS BOTTLE MANUFACTURERS are moving their head office to 8 Leicester Street, W.C.2, as from January 10.

THE LATEST PRICE LIST OF FINE CHEMICALS supplied by Hopkin and Williams, Ltd., is much enlarged and improved.

NEGOTIATIONS HAVE BEEN COMPLETED by Seager Evans and Co., for the acquisition of a group of old-established distillery businesses in the North of Scotland.

IT WAS ON DECEMBER 24, 1936, that work began on the Treforest Trading Estate, the Government-aided scheme for attracting new industries to South Wales.

JAMES JENNINGS AND CO., LTD., soap manufacturers, have increased their nominal capital by the addition of £2,000 in £1 ordinary shares, beyond the registered capital of £3,000.

BONUSES FOR WORKERS IN THE CHINA CLAY INDUSTRY were announced on December 21, by English China Clays, Ltd., and some other china clay producers. The disbursements amount to about £5,000, and over three thousand workers are affected.

TENDERS ARE INVITED by Exmouth Urban District Council, by Bideford Town Council and by the Devon County Council for the supply, for the year commencing April 1, 1938, of disinfectants, cement, motor spirit, lubricating oils, etc. Tenders have to reach the Clerk to the Council not later than noon on January 19.

AS FROM JANUARY, 1938, "Engineering Abstracts" will be issued monthly in sectionalised form so that subscribers will be able to purchase individual sections if they do not require all the sections. The abstracts include references to important articles in journals published in the British Isles, in addition to abstracts from articles appearing in foreign journals. They are published by The Institution of Civil Engineers with the co-operation of other engineering societies and bodies in Great Britain and the Dominions.

DUFFIELD COAL PRODUCTS, LTD., will shortly engage in the manufacture of methyl alcohol. It is hoped to establish production works in England, the Dominions, and possibly also in some foreign countries. An announcement to this effect was made by Mr. F. L. Duffield, the chairman, on the occasion of a company meeting on December 20. He said that the company was in negotiation with financial and industrial concerns, but meanwhile he intended to advance money privately to meet the company's needs in connection with this project.

SIR HAROLD HARTLEY, F.R.S., director of research, L.M.S. Railway Co., and chairman of the Fuel Research Board, has been awarded the Wilhelm Exner medal for services to industrial research of the Lower Austrian Association of Commerce and Industry. The medal, founded 16 years ago, has been awarded to many famous scientists, including Fritz Haber, and Bosch, but only once before to a British recipient, the late Lord Rutherford. The other recipients on the present occasion were Dr. Friedrich Bergius, of Heidelberg University and Dr. Ernst Späth, rector of Vienna University.

CATALOGUES OF THE 1938 BRITISH INDUSTRIES FAIR, in nine languages, are now on their way to sixty-five countries. The Fair opens on February 21, and the issue of the catalogue two months in advance is a record in the history of trade fairs. The London catalogue carries as an inset the advance list of some 800 exhibitors occupying 298,000 square feet of space at Birmingham bringing the total area occupied by exhibits up to 845,000 square feet which is well in excess of the 1937 record figure. A new idea in London this year will be the display on many stands of cards in chromium-plated frames announcing to overseas buyers the various languages spoken by exhibitors.

New Companies Registered

Lancaster Research Company, Ltd. 334,765.—Private company. Capital £100 in 100 shares of £1 each. To carry on business as research chemists and manufacturers of and dealers in chemicals and chemical products of all kinds, etc. Subscribers: Arthur J. Thomas, 93 St. Leonardgate, Lancaster; Richard R. Woods.

M.P.W. Accessory Supply Co., Ltd. (20,086).—Private company. Capital, £1,000 in £1 shares. To carry on the business of manufacturers, importers and exporters of and dealers in disinfectants and germicides and instruments for spraying, etc. Directors: James R. Marshall, 43 West Main Street, Armadale, Richard Peebles, David Williamson. Registered Office: 23 Rutland Square, Edinburgh.

Chromo Biochemical Co., Ltd. 334,706.—Private company. Capital £100 in 2,000 ordinary shares of 1s. each. To carry on the business of importers and exporters, manufacturers and distributors of and dealers in all kinds of chromo bio-chemical and bio-chemical preparations and substances, etc. Directors: William Anderson, "Redlands," Gedling Road, Carlton, Notts; Agnes Gilbert. Registered Office: 74 Mansfield Road, Nottingham.

Inventions in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Applications for Patents

TREATMENT OF RUBBER.—Avon India Rubber Co., Ltd., S. Buchan and J. G. Mackay. 34660.

DERIVATIVES OF ARYL-METHANES.—H. J. Barber. 34288.

MANUFACTURE OF CYCLIC AMIDINES.—A. G. Bloxam (Soc. of Chemical Industry in Basle.) 34578.

MANUFACTURE OF NITRILES.—Boots Pure Drug Co., Ltd., A. P. T. Easson, and F. L. Pyman. 34286.

TREATMENT OF ORGANIC-ACID ANHYDRIDES.—British Celanese, Ltd. (United States, Dec. 24, '36.) 34757.

MANUFACTURE OF CONDENSATION PRODUCTS.—British Industrial Plastics, Ltd., and A. Brooks. 34468.

MANUFACTURE OF GUANIDINE NITRATE.—R. Burns, P. F. Gay, and Industrial Chemical Industries, Ltd. 34755.

COATING AND IMPREGNATING OF MATERIALS.—A. Carpmael (I. G. Farbenindustrie.) 34140.

WHITE OPACIFIERS FOR ENAMELS, ETC.—Deutsche Gold-und Silber Scheideanstalt vorm. Roessler. (Germany, Dec. 9, '36.) 34119.

PRODUCTION OF CERIUM COMPOUNDS.—Deutsche Gold-und Silber Scheideanstalt vorm. Roessler. (Germany, Dec. 10, '36.) 34298.

TREATMENT OF COTTON, ETC., THREAD, for rubber adhesion.—Dunlop Rubber Co., Ltd., and A. Niven. 34721.

PURIFICATION OF CELLULOSE ETHERS.—Dow Chemical Co. (United States, Jan. 18.) 34509.

TREATMENT OF RAW MINERAL MATERIALS.—C. E. Exery (Smidth and Co. Aktielskab). 34388.

MANUFACTURE OF ARTIFICIAL ORGANIC BODIES.—J. P. Fraser. 34488.

REDUCTION OF METAL OXIDES.—H. Gallusser. (Germany, Dec. 16, '36.) 34726.

PREPARATION OF SUPERPHOSPHATES.—J. G. Gaunt (Compagnie Nationale de Matieres Colorantes et Manufactures de Products Chimiques du Nord Reunies, Etablissements Kuhlmann). 34380.

MANUFACTURE OF CYANINE DYESTUFFS, ETC.—N. V. Gevaert Photo Producten. (Jan. 15.) 34434.

MANUFACTURE OF CYCLIC ACETALS OF FORMALDEHYDE.—W. W. Groves (I. G. Farbenindustrie.) 34579.

MANUFACTURE OF HALOGEN-METHYLATED AROMATIC HYDROXYL COMPOUNDS.—W. W. Groves (I. G. Farbenindustrie.) 34580.

FINISHING ANIMAL, ETC., FIBROUS MATERIALS.—W. W. Groves (I. G. Farbenindustrie.) 34736.

EXTRACTION OF ZINC, ETC., FROM ORE.—F. W. Harbord, and F. F. Law. 34338.

MANUFACTURE OF PAINT, ETC.—Hardman and Holden, Ltd., S. G. Campbell, H. S. Land, and H. W. Smith. 34538.

MANUFACTURE OF SYMMETRICAL DI-HYDROXYALKYLATED AMINO-ARSENO BENZENES.—I. G. Farbenindustrie. (Germany, Dec. 19, '36.) 34374.

MANUFACTURE OF ORTHO-OXYAZO-DYESTUFFS.—I. G. Farbenindustrie. (Germany, Jan. 13.) 34233.

COPPER BASE ALLOYS.—Imperial Chemical Industries, Ltd. (American Brass Co.). 34322.

SURFACES OF METALS, ETC.—Institut für Physikalische Chemie der Metalle am Kaiser-Wilhelm-Institut für Metallforschung. (Germany, Dec. 14, '36.) 34633.

METHOD OF TREATING ELASTIC MATERIALS, ETC.—International Latex Processes, Ltd. (United States, Dec. 19, '36.) 34564.

MANUFACTURE OF PETROLEUM JELLY, ETC.—G. W. Johnson (I. G. Farbenindustrie.) 34106.

MANUFACTURE OF ACID DYESTUFFS.—G. W. Johnson (I. G. Farbenindustrie.) 34107.

GASIFICATION OF FUELS WITH STEAM.—G. W. Johnson (I. G. Farbenindustrie.) 34108.

MANUFACTURE OF DYESTUFFS.—G. W. Johnson (I. G. Farbenindustrie.) 34268.

MANUFACTURE OF GASEOUS OLEFINES.—G. W. Johnson (I. G. Farbenindustrie.) 34454.

MANUFACTURE OF MOTOR FUELS.—G. W. Johnson (I. G. Farbenindustrie.) 34455.

PRODUCTION OF ORGANIC PIGMENTS.—R. N. Johnson (I. G. Farbenindustrie), and R. P. Foulds. 34053.

MAGNETIC ORE DRESSING FOR FERROUS CARBONATE ORES.—Kaiser-Wilhelm-Instituts für Eisenforschung. (Germany, Dec. 14, '36.) 34611.

MANUFACTURE OF METALLURGICAL PRODUCTS.—R. Mautsch. (Germany, Dec. 24, '36.) 34373.

DERIVATIVES OF ARYL-METHANES.—May and Baker, Ltd., and A. J. Ewins. 34288.

THERAPEUTICALLY ACTIVE SULPHONAMIDO DERIVATIVES.—May and Baker, Ltd. 34289.

ORGANIC ARSENIC COMPOUNDS.—May and Baker, Ltd., and M. A. Phillips. 34765.

THERAPEUTICALLY ACTIVE SULPHONAMIDO DERIVATIVES.—G. Newbery. 34289.

METALLIC COMPOSITIONS.—J. E. Newns. 34124, 34125.

PRODUCTION OF NON-ACTIVE CARBON, ETC.—Newspaper, Pulp, and Wood Export, Ltd. (France, Dec. 15, '36.) 34730, 34731.

MANUFACTURE OF ALKALOID SALTS, ETC.—J. L. Régnier. (France, April 29, '35.) (April 1, '36.) 34581.

PROCESS FOR CONTROLLING THE ODOUR, ETC., OF EDIBLE OILS, ETC.—H. O. Renner. 34656.

MANUFACTURE OF POLYSULPHONATES or aromatic polyalkylene ethers.—Röhm and Haas Co. (United States, Jan. 12.) 34074.

SEPARATION OF TRIMETHYLAMINE from mixtures of monomethylamine and dimethylamine.—Röhm and Haas Co. (United States, Jan. 6.) 34215.

MANUFACTURE OF BERYLLIUM FLUORIDE.—Seri Holding Soc. Anon. (Italy, April 24.) 34141.

TREATMENT OF MATERIALS containing tantalum and niobium.—Soc. Générale Métallurgique de Hoboken, and J. P. Leemans. 34700.

MANUFACTURE OF HYDANTOINS containing the sterol nucleus.—Soc. of Chemical Industry in Basle. (Switzerland, Dec. 24, '36.) 34232.

MANUFACTURE OF LOCAL ANAESTHETIC BASES, ETC.—A. H. Stevens (Novocol Chemical Manufacturing Co.). (Sept. 1, '36.) 34573.

PRODUCTION OF ORGANIC COMPOUNDS, ETC.—A. H. Stevens (Phillips Petroleum Co.). 34575.

PRODUCTION OF ORGANIC PIGMENTS.—Tootal Broadhurst Lee Co., Ltd. 34053.

PRODUCTION OF HYDROCARBONS, ETC.—Universal Oil Products Co. (United States, Aug. 23.) 34274.

Specifications Open to Public Inspection

TREATMENT OF ALUMINOUS SILICIOUS MATERIAL.—Electric Smelting and Aluminium Co. June 11. 11042/37.

PROCESS FOR THE CONTINUOUS PRODUCTION OF ZINC in vertical reduction chambers.—Metallges, A.-G. June 10, 1936. 12773/37.

PROCESS FOR CONCENTRATING LOW-GRADE IRON ORES.—Metallges, A.-G. June 13, 1936. 13676/37.

MANUFACTURE OF RUBBER PRODUCTS.—J. Behre, H. Voss, R. Fromm, and J. Mau (trading as Lehmann and Voss and Co.). June 9, 1936. 13808/37.

STEEL ALLOYS.—Kohle-und Eisenforschung Ges. June 11, 1936. 14394/37.

PROCESSES FOR OBTAINING METALS FROM THEIR ORES.—E. Edwin. June 13, 1936. 14445/37.

METHOD OF PRODUCING DICALCIUM-PHOSPHATE and calcium-nitrate solution.—Kunstdunger-Patent-Verwertungs-A.-G. June 12, 1936. 14518/37.

PROCESS FOR THE TREATMENT OF ARTIFICIAL FIBRES obtained from casein.—Montecatini, Soc. Generale Per L'Industria Mineraria ed Agricola. June 8, 1936. 14744/37.

MANUFACTURE OF BASIC ESTERS of polyarylacetic acids.—A. G. Bloxam. June 8, 1936. 14860/37.

CATALYTIC PRODUCTION OF HYDROCARBONS.—Ruhrchemie, A.-G. June 10, 1936. 15156/37.

PROCESS FOR PRODUCING CYCLOPROPANE.—Purdue Research Foundation. June 13, 1936. 15204/37.

PROCESS FOR OBTAINING HYDROCARBONS from marine animal oils.—Eastman Kodak Co. June 12, 1936. 15285/37.

PROCESS FOR THE MANUFACTURE OF FLUORO-SULPHONIC ACID.—I. G. Farbenindustrie. June 11, 1936. 15349/37.

BORON CARBIDE ALLOY and a method of making the same.—Norton Grinding Wheel Co., Ltd. June 10, 1936. 15515/37.

METHOD OF MAKING BORON CARBIDES.—Norton Grinding Wheel Co., Ltd. June 10, 1936. 15516/37.

MANUFACTURE OF FILMS or the like from polymerides.—Deutsche Celluloid Fabrik. June 11, 1936. 15531/37.

PROCESS FOR THE PREPARATION OF POTASSIUM NITRATE.—Soc. D'Etudes Pour La Fabrication et L'Emploi Des Engrais Chimiques. June 8, 1936. 15557/37.

RUBBER COMPOUND.—United States Rubber Products, Inc. June 10, 1936. 15623/37.

PROCESS AND APPARATUS FOR CARRYING OUT INDUSTRIAL ALCOHOLIC FERMENTATIONS.—Usines de Melle, and F. Boinot. June 8, 1936. 15725/37.

MANUFACTURE OF VAT DYESTUFFS of the dipyrazolenthrone series.—I. G. Farbenindustrie. June 9, 1936. 15767/37.

CERAMIC MATERIAL.—Steatit-Magnesia, A.-G. June 8, 1936. 15773/37.

PROCESS FOR THE MANUFACTURE OF CRYSTALLISED SUGAR.—G. Lambinon. June 8, 1936. 15781.

DISTILLATION OF HIGH-BOILING LIQUIDS such as fatty acids.—Colgate-Palmolive-Peet Co. June 11, 1936. 15784/37.

PROCESS FOR THE SEPARATION OF PARAFFIN from paraffin-containing hydrocarbon mixtures.—Edeleanu-Ges. June 8, 1936. (Cognate Application, 15884/37). 15883/37.

REFINING OF HYDROCARBON OILS.—Edeleanu-Ges. June 8, 1936. 15885/37.

PROCESS AND APPARATUS FOR VAPORISING METALS and other substances difficult to vaporise.—R. Maier. June 8, 1936. (Cognate Applications, 15911/37 and 15912/37.) 15910/37.

CHROMIUM-MANGANESE STEEL.—Electro Metallurgical Co. June 11, 1936. 15933.

CHROMIUM-MANGANESE-NICKEL STEEL.—Electro Metallurgical Co. June 11, 1936. 15934/37.

CORROSION-RESISTANT STEELS.—Electro Metallurgical Co. June 11, 1936. (Cognate Application, 15937/37.) 15936/37.

PRODUCTION OF ALKALINE EARTH.—Naamlooze Vennootschap Philips' Gloeilampenfabrieken. June 12, 1936. 15991/37.

PROCESS FOR THE MANUFACTURE OF COMPLEX GOLD COMPOUNDS of albumose-like keratin degradation products containing sulphhydril groups.—Schering-Kahlbaum, A.-G. June 12, 1936. (Cognate Application, 16005/37.) 16004/37.

PROCESS FOR THE PREPARATION OF CATALYSTS for chemical reactions in which carbon oxides participate.—G. Natta. June 10, 1936. 16111/37.

MANUFACTURE OF DERIVATIVES of the cyclopentanosolyhydrophenanthrene.—I. G. Farbenindustrie. June 11, 1936. 16137/37.

MANUFACTURE OF MONO-CHLORONAPHTHALENE.—W. W. Groves. June 13, 1936. 16453/37.

RECOVERY OF SULPHURETTED HYDROGEN and hydrogen cyanide from gases.—Staatsmijnen in Limburg, and Dr. C. Otto and Co. June 12, 1936. 16454/37.

FERRO-NICKEL ALLOYS.—British Thomson-Houston Co., Ltd. June 13, 1936. 16465/37.

Specifications Accepted with Date of Application

DECOMPOSITION OF GASEOUS MIXTURES BY LIQUEFACTION and rectification.—Ges. Fur Linde's Eismaschinen, A.-G. May 19, 1936. (Cognate Application, 8870/37.) 476,015.

EXPLOSIVES AND METHODS OF MANUFACTURE THEREOF.—Hercules Powder Co. May 11, 1936. 476,285.

CONVERSION OF HYDROCARBON OILS.—A. L. Mond (Universal Oil Products Co.). May 10, 1937. 476,026.

MANUFACTURE OF CONDENSATION PRODUCTS from diazines and aldehydes.—I. G. Farbenindustrie. June 24, 1936. 476,032.

LEAD ALLOYS.—Goodlass Wall and Lead Industries, Ltd., and W. T. Butcher. Aug. 8, 1936. 476,223.

WATER-RESISTANT RUBBER COMPOSITIONS.—Dewey and Almy, Ltd. (Dewey and Almy Chemical Co.). March 6, 1936. 476,481.

PROCESS FOR THE MANUFACTURE OF ORGANIC ADDITION COMPOUNDS containing heavy metals.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. April 11, 1935. 476,329.

MEANS FOR TREATING FUEL GASES.—Koppers Co. Oct. 9, 1935. 476,332.

ARTICLES MOULDED FROM CELLULOSIC FIBROUS PULP.—J. Berghoff. March 19, 1936. 476,424.

DEPHOSPHORISATION AND DESULPHURISATION OF STEEL.—Soc. D'Electro-Chimie, D'Electro-Metallurgie, et des Acieres Electriques D'Ugine. April 11, 1935. 476,483.

COOKING OF DRYING OILS and varnishes.—H. V. A. Briscoe. May 8, 1936. 476,563.

TREATMENT OF MATERIALS containing tantalum and/or niobium. W. W. Triggs (Soc. Generale Metallurgique de Hoboken). May 4, 1936. 476,557; May 5, 1936. 476,558.

TREATMENT OF POLYVINYL ALCOHOLS or their partial derivatives.—Chemische Forschungsges. June 5, 1935. 476,426.

DISTILLATION OF MIXTURES of carbonaceous material and oil. W. B. Mitford, and C. H. Lander. June 4, 1936. 476,427.

MANUFACTURE AND APPLICATION OF AZO DYESTUFFS.—M. Mendoza, G. S. J. White, and Imperial Chemical Industries, Ltd. June 4, 1936. 476,428.

MANUFACTURE AND PRODUCTION OF AZO DYESTUFFS.—G. W. Johnson (I. G. Farbenindustrie.) June 6, 1936. 476,493.

ELECTROLYTIC PRODUCTION OF ESTERS.—Nitroglycerin Aktiebolaget, and V. Ohman. June 8, 1936. 476,387.

MANUFACTURE OF THIAZOLIDINE DERIVATIVES.—I. G. Farbenindustrie. June 8, 1935. 476,570.

IMPROVING THE RESISTANCE TO CORRODING AGENTS of aluminium base alloys.—I. G. Farbenindustrie. June 8, 1936. (Addition to 432,351 and 450,832.) 476,627.

TREATMENT OF RAW MATERIALS for the manufacture of cement or lime.—M. Vogel-Jorgensen. June 8, 1936. 476,435.

PROCESS FOR THE MANUFACTURE OF RESINOUS CONDENSATION PRODUCTS.—Beck, Koller and Co. (England), Ltd. June 8, 1935. 476,628.

TREATMENT OF PLASTICISABLE COMPOUNDS.—British Celanese, Ltd., and W. H. Moss. June 10, 1936. 476,638.

PRODUCTION OF RUBBER TAPE.—International Latex Processes, Ltd., and R. G. James. June 11, 1936. 476,506.

PREPARATION OF THIAZTHIONIUM CHLORIDES.—Calco Chemical Co., Inc. June 20, 1935. 476,588.

PROCESS FOR THE MANUFACTURE OF IODINATED HYDNOCARPUS ACIDS or their esters.—A. Carpmael (I. G. Farbenindustrie.) June 11, 1936. (Samples furnished.) 476,644.

TREATMENT OF GRANULAR OR PULVERULENT MATERIAL with gases. N. Ahlmann. June 12, 1936. 476,594.

PROCESS FOR THE MANUFACTURE OF CONDENSATION PRODUCTS of the anthraquinone series.—A. Carpmael (I. G. Farbenindustrie.) June 12, 1936. 476,599.

MANUFACTURE OF UREA-FORMALDEHYDE CONDENSATION PRODUCTS. J. A. Hetherington, and British Xylonite Co., Ltd. June 13, 1936. 476,608.

FRACTIONAL SEPARATION OF CRUDE HYDROCARBON OIL.—F. J. Cleveland (J. Pintsch, A.-G.). June 18, 1936. 476,610.

PRODUCTION OF CERAMIC MATERIALS.—Steatit-Magnesia, A.-G. June 20, 1935. 476,393.

MANUFACTURE OF AMIDINES.—Soc. of Chemical Industry in Basle. June 21, 1935. 476,611, 476,612.

DETERGENTS.—Rumford Chemical Works. Oct. 5, 1935. 476,455.

PRODUCTION OF SILICEOUS REFRACTORY ARTICLES.—A. F. Burgess (National Aluminate Corporation). April 22, 1937. 476,623.

MANUFACTURE OF FILTERING MASSES for removing aerosols and like minute suspended matter from the atmosphere.—Soc. Italiana Pirelli. June 10, 1936. (Addition to 433,190 and 434,700.) 476,372.

Chemical and Allied Stocks and Shares

THE stock and share markets have been slow to shake off the influence of holiday conditions and very little improvement in the volume of business has been reported at the time of writing. On the other hand, share values have been fairly well maintained and the absence of selling pressure is generally regarded as indicating confident anticipations of better market conditions early in the New Year.

Imperial Chemical at 35s. 3d. are virtually unchanged on balance. The highest and lowest prices recorded for the shares in 1937 were 41s. 10½d. and 31s. 3d. respectively. Most other leading industrial securities have shown considerably wider fluctuations during the past year. Distillers, for instance, have extreme prices of 124s. 9d. and 96s. 6d., while British Oxygen have corresponding prices of 138s. 9d. and 76s. 3d. At the time of writing Distillers are 107s. and British Oxygen 83s. 9d. Wide variations have been shown by many other shares of companies connected with the chemical and kindred industries, but they have to be read in relation to the very uncertain trend of markets which have ruled and not as an indication that reduced dividends are being anticipated. Indeed, in the case of Imperial Chemical, Distillers and British Oxygen, the market is continuing to take the view that dividend payments are likely to be at least maintained.

Boots Pure Drug at 45s. 3d. are the same as a week ago. Highest and lowest prices in the past year were 64s. 6d. and 41s. 9d. For many years the company has made distributions of 29 per cent. (including annual bonuses of 5 per cent., tax free), and it is confidently expected in the market that this will be maintained. Moreover, the strength of the balance sheet is generally believed to warrant hopes of an eventual scrip bonus —but it has to be remembered that the directors follow the policy of distributing profits on a conservative basis and providing for expansion of the business without the raising of additional capital.

Lever Brothers ordinary at 36s. 6d. are well maintained on the week as are United Molasses at 25s. 3d., while there has been further improvement in British Aluminium from 45s. 10½d. to 46s. 3d. at the time of writing. Following the preliminary announcement of the proposed merger, Associated Portland Cement have gone back from 90s. 7½d. to 88s. 6d., but Alpha Cement have improved on balance from 36s. 9d. to 38s. 1½d. Borax Consolidated at 27s. 6d. are a few pence better, it being pointed out that a satisfactory yield is offered and that in respect of the year ended September 30 last a moderate increase in dividend is possible. For the previous year 7½ per cent. was paid. Triplex Safety Glass at 52s. have been well maintained and Pinchin Johnson at 38s. 4½d. are within a few pence of the price current a week ago, as are General Refractories at 20s. 3d.

There has been a better tendency in iron and steel shares. Richard Thomas were bought on attention drawn to the large yield offered by these 6s. 8d. shares on the basis of last year's 15 per cent. dividend, and the price has improved to 10s. 6d. A larger capital ranks, but the fact that the interim has been maintained at 5 per cent., has aroused hopes that the total payment for the year will also be unchanged. Dorman Long at 34s. 6d. have lost a moderate part of their improvement in the previous week, but Consett Iron, which were active, show virtually no change at 11s. 3d.

Courtaulds at 47s. 3d. were active on the recent announcement of the decision to increase rayon yarn prices and on hopes that a moderately larger dividend may be paid for the year. Announcement of the final dividend is due in February. Oil shares showed an uncertain tendency.

Weekly Prices of British Chemical Products

THE demand for chemicals during the past two weeks has been about the average for the period, quiet conditions prevailing during the week preceding the Christmas holidays. Interest has speedily returned to most sections of the market, however, and the present week should see normal activity proceeding. Quotations generally have been on a steady basis, there are, however, one or two adjustments to record. Glycerine is 10s. per cwt. lower than the prices previously reported. An adjustment in the price of Mercurials has been notified by the makers, but the alteration only affects parcels of less than 28 lb., for which quotations are now 4d. per lb. higher. There are no other important changes to report. In the Coal Tar section business has been definitely slow with both buyers and sellers marking time. Values for Coal Tar products remain fairly steady and the undertone perhaps a little firmer.

MANCHESTER.—Business in both light and heavy chemicals on the Manchester market has opened quietly this week after the holidays, and actual buying interest has been conspicuous by its absence. Stocktaking operations have had a restrictive influence upon the movement of supplies into consumption against existing contracts and from this point of view not much improvement is looked for until about the second week in January. Prices in most directions are on a steady to firm basis and are expected to continue so. The only exceptions of any consequence are to be found among the by-products, though even here actual changes compared with a week ago have been slight.

GLASGOW.—With the approach of the New Year holidays, there has been a further falling off in the demand for general chemicals for home trade, and export inquiry also remains very limited. There is still a good deal of contract business being placed for 1938 delivery, however, on basis of the increased prices advised recently.

Price Changes

Rises: Ammonium Dichromate; Lead Acetate, white and brown (Manchester); Nitric Acid.

Falls: Copper Sulphate (Scotland); Glycerine; Cresylic Acid, 97/99%; Pale, 99/100%; Dark, 95%; Naphthalene, crude, whizzed or hot pressed; Pitch (Manchester).

General Chemicals

ACETONE.—£45 to £47 per ton.

ACETIC ACID.—Tech, 80%, £30 5s. per ton; pure 80%, £32 5s.; tech., 40%, £15 12s. 6d. to £18 12s. 6d.; tech., 60%, £23 10s. to £25 10s. MANCHESTER: 80%, commercial, £30 5s.; tech. glacial, £42 to £46.

ALUM.—Loose lump, £8 7s. 6d. per ton d/d; GLASGOW: Ground, £10 7s. 6d. per ton; lump, £9 17s. 6d.

ALUMINIUM SULPHATE.—£7 2s. 6d. per ton d/d Lancs. GLASGOW: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 1s. to 1s. 1d. per lb. d/d in cylinders. SCOTLAND: 10½d. to 1s. 0½d., containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM CARBONATE.—£20 per ton d/d in 5 cwt. casks.

AMMONIUM CHLORIDE.—Grey galvanising, £18 10s. per ton, ex wharf.

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

AMMONIUM DICHROMATE.—8½d. per lb. d/d U.K.

ANTIMONY OXIDE.—£68 per ton.

ARSENIC.—Continental material £11 per ton c.i.f., U.K. ports; Cornish White, £12 5s. to £12 10s. per ton f.o.r., mines, according to quantity. MANCHESTER: White powdered Cornish, £16 10s. per ton, ex store.

BARIUM CHLORIDE.—£11 10s. to £12 10s. per ton in casks ex store. GLASGOW: £11 10s. per ton.

BLEACHING POWDER.—Spot, 35/37%, £8 15s. per ton in casks, special terms for contracts. SCOTLAND: £9 per ton net ex store.

BORAX COMMERCIAL.—Granulated, £16 per ton; crystal, £17; powdered, £17 10s.; extra finely powdered, £18 10s., packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. GLASGOW: Granulated, £16, crystal, £17; powdered, £17 10s. per ton in 1-cwt. bags, carriage paid.

BORIC ACID.—Commercial granulated, £28 10s. per ton; crystal, £29 10s.; powdered, £30 10s.; extra finely powdered, £32 10s. in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. GLASGOW: Crystals, £29 10s.; powdered, £30 10s. 1-cwt. bags in 1-ton lots.

CALCIUM BISULPHITE.—£6 10s. per ton f.o.r. London.

CHARCOAL, LUMP.—£6 to £6 10s. per ton, ex wharf. Granulated, £7 to £9 per ton according to grade and locality.

CHROMETAN.—Crystals, 2½d. per lb; liquor, £19 10s. per ton d/d. station in drums. GLASGOW: 70/75% solid, £5 15s. per ton net ex store.

CHROMIC ACID.—9½d. per lb., less 2½%; d/d U.K.

CHROMIUM OXIDE.—11d. per lb.; d/d U.K.

CITRIC ACID.—1s. 0½d. per lb. MANCHESTER: 1s. 0½d. SCOTLAND: B.P. crystals, 1s. 0¾d. per lb.; less 5%, ex store.

COPPER SULPHATE.—£21 7s. 6d. per ton, less 2% in casks. MANCHESTER: £18 10s. to £18 15s. per ton f.o.b. SCOTLAND: £20 per ton, less 5%, Liverpool, in casks.

CREAM OF TARTAR.—100%, 92s. per cwt., less 2½%. GLASGOW: 99%, £4 12s. per cwt. in 5-cwt. casks.

FORMALDEHYDE.—£22 10s. per ton.

FORMIC ACID.—85%, in carboys, ton lots, £42 to £47 per ton.

GLYCERINE.—Chemically pure, double distilled, 1.260 s.g., in tins, £4 17s. 6d. to £5 17s. 6d. per cwt. according to quantity; in drums, £4 10s. 6d. to £5 3s. 6d.

HYDROCHLORIC ACID.—Spot, 5s. to 7s. 6d. carboy d/d according to purity, strength and locality.

IODINE.—Resublimed B.P., 6s. 4d. per lb. in 7 lb. lots.

LACTIC ACID.—(Not less than ton lots) Dark, 50% by volume, £21 10s.; by weight, £27 10s.; Pale, 50% by volume, £27; by weight, £32 per ton. LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £50; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £55; edible, 50%, by vol., £41. One-ton lots ex works, barrels free.

LEAD ACETATE.—LONDON: White, £31 10s. ton lots; brown, £35. GLASGOW: White crystals, £31 10s.; brown, £1 per ton less. MANCHESTER: White, £36; brown, £35.

LEAD NITRATE.—£34 per ton for 1-ton lots.

LEAD, RED.—£32 15s. 0d., 10 cwt. to 1 ton, less 2½% carriage paid. SCOTLAND: £32 per ton, less 2½% carriage paid for 2-ton lots.

LITHARGE.—SCOTLAND: Ground, £32 per ton, less 2½%. carriage paid for 2-ton lots.

MAGNESITE.—SCOTLAND: Ground calcined, £9 per ton, ex store.

MAGNESIUM CHLORIDE.—SCOTLAND: £7 10s. per ton.

MAGNESIUM SULPHATE.—Commercial, £5 10s. per ton, ex wharf.

MERCURY.—Ammoniated B.P. (white precip.), lump, 5s. 11d per lb.; powder B.P., 6s 1d.; bichloride B.P. (corros. sub.) 5s. 2d.; powder B.P. 4s. 10d.; chloride B.P. (calomel), 5s. 11d.; red oxide cryst. (red precip.), 7s.; levig. 6s. 6d.; yellow oxide B.P. 6s. 4d.; persulphate white B.P.C., 6s. 1d.; sulphide black (hyd. sulph. cum sulph. 50%), 6s. For quantities under 112 lb., 1d. extra; under 28 lb., 5d. extra.

METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NITRIC ACID.—Spot, £17 to £30 per ton according to strength and destination.

OXALIC ACID.—£48 15s. to £57 10s. per ton, according to packages and position. GLASGOW: £2 9s. per cwt. in casks. MANCHESTER: £49 to £54 per ton ex store.

PARAFFIN WAX.—SCOTLAND: 3¾d. per lb.

POTASH CAUSTIC.—Solid, £35 5s. to £36 15s. per ton for 2-ton lots ex store; broken, £42 per ton. MANCHESTER: £39.

POTASSIUM CHLORATE.—£36 7s. 6d. per ton. GLASGOW: 4½d. per lb. MANCHESTER: £37 10s. per ton.

POTASSIUM DICHROMATE.—5¼d. per lb. carriage paid. SCOTLAND: 5¼d. per lb., net, carriage paid.

POTASSIUM IODIDE.—B.P. 5s. 6d per lb. in 7 lb. lots.

POTASSIUM NITRATE.—Small granular crystals, £24 to £27 per ton ex store, according to quantity. GLASGOW: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 9¾d. per lb. SCOTLAND: B.P. Crystals, 9¾d. MANCHESTER: B.P. 10¾d. to 1s.

POTASSIUM PRUSSIATE.—6½d. per lb. SCOTLAND: 7d. net, in casks, ex store. MANCHESTER: Yellow, 6½d.

SALAMMONIAC.—Dog-tooth crystals, £36 per ton, fine white crystals, £17 10s. per ton, in casks, ex store. GLASGOW: Large crystals, in casks, £37 10s.

SALT CAKE.—Unground, spot, £3 to £3 10s. per ton.

SODA ASH.—58% spot, £5 17s. 6d. per ton f.o.r. in bags.

SODA, CAUSTIC.—Solid, 76/77° spot, £12 10s. per ton d/d station. SCOTLAND: Powdered 98/99%, £18 10s. in drums, £19 5s. in casks, Solid 76/77° £15 12s. 6d. in drums; 70/73%, £15 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts, 10s. per ton less.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—£18 per ton carriage paid North. GLASGOW: £17 15s. per ton net ex store.

SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. GLASGOW: £13 5s. per ton in 1 cwt. kegs, £11 5s. per ton in 2-cwt. bags. MANCHESTER: £10 10s.

SODIUM BISULPHITE POWDER.—60/62%, £20 per ton d/d 1 cwt. iron drums for home trade.

SODIUM CARBONATE MONOHYDRATE.—£15 5s. per ton d/d in minimum ton lots in 2 cwt. free bags

SODIUM CHLORATE.—£27 10s. to £32 per ton. GLASGOW: £1 11s. per cwt., minimum 3 cwt. lots.

SODIUM CHROMATE.—4¼d. per lb. d/d U.K.

SODIUM DICHROMATE.—Crystals cake and powder 4¼d. per lb. net d/d U.K. with rebates for contracts. MANCHESTER: 4d. per lb. GLASGOW: 4¼d. net, carriage paid.

SODIUM HYPOSULPHITE.—Pea crystals, £14 10s. per ton for 2-ton lots; commercial, £11 5s. per ton. MANCHESTER: Commercial, £11; photographic, £15 10s.

SODIUM METASILICATE.—£14 5s. per ton, d/d U.K. in cwt. bags.

SODIUM NITRATE.—Refined, £8 per ton for 6-ton lots d/d. GLASGOW: £1 12s. 0d. per cwt. in 1-cwt. kegs, net, ex store.

SODIUM NITRITE.—£18 5s. per ton for ton lots.

SODIUM PERBORATE.—10%, 9¼d. per lb. d/d in 1-cwt. drums.

SODIUM PHOSPHATE.—Di-sodium, £12 per ton delivered for ton lots. Tri-sodium, £15 to £16 per ton delivered per ton lots.

SODIUM PRUSSIATE.—5d. per lb. for ton lots. GLASGOW: 5d. to 5¾d. ex store. MANCHESTER: 4½d. to 5d.

SODIUM SILICATE.—£9 10s. per ton.

SODIUM SULPHATE (GLAUBER SALTS).—£3 per ton d/d.

SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 to £3 10s. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 12s. 6d.

SODIUM SULPHIDE.—Solid 60/62%, Spot, £11 5s. per ton d/d in drums; crystals 30/32%, £8 15s. per ton d/d in casks. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8 10s.

SODIUM SULPHITE.—Pea crystals, spot, £13 10s. per ton d/d station in kegs.

SULPHUR PRECIP.—B.P., £55 to £60 per ton according to quantity. Commercial, £50 to £55.

SULPHURIC ACID.—168° Tw., £4 11s. to £5 1s. per ton; 140° Tw., arsenic-free, £3 to £3 10s.; 140° Tw., arsenious, £2 10s.

TARTARIC ACID.—1s. 1½d. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards. MANCHESTER: 1s. 1½d. per lb. GLASGOW: 1s. 1d. per lb., 5%, ex store.

WHITE SUGAR OF LEAD.—£31 10s. per ton net.

ZINC SULPHATE.—Tech., £12 10s. f.o.r., in 2 cwt. bags.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 7d. to 1s. 2d. per lb., according to quality. Crimson, 1s. 6d. to 1s. 7½d. per lb.

ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.

BARYTES.—£6 to £6 10s. per ton, according to quality.

CADMIUM SULPHIDE.—7s. 3d. to 7s. 6d. per lb.

CARBON BLACK.—4¾d. per lb., ex store.

CARBON DISULPHIDE.—£31 to £33 per ton, according to quantity, drums extra.

CARBON TETRACHLORIDE.—£41 to £46 per ton, according to quantity, drums extra.

CHROMIUM OXIDE.—Green, 10½d. to 11d. per lb.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

INDIA-RUBBER SUBSTITUTES.—White, 4¾d. to 5½d. per lb.; dark 4d. to 4½d. per lb.

LAMP BLACK.—£28 to £30 per ton del., according to quantity. Vegetable black, £35 per ton upwards.

LEAD HYPOSULPHITE.—9d. per lb.

LITHOPONE.—30%, £16 10s. to £17 5s. per ton.

SULPHUR.—£9 to £9 5s. per ton. SULPHUR PRECIP. B.P., £55 to £60 per ton. SULPHUR PRECIP. COMM., £50 to £55 per ton.

SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quantity.

VERMILION.—Pale, or deep, 5s. per lb., 1-cwt. lots.

ZINC SULPHIDE.—£58 to £60 per ton in casks ex store, smaller quantities up to 1s. per lb.

Nitrogen Fertilisers

AMMONIUM SULPHATE.—The following prices have been announced for neutral quality basis 20.6% nitrogen, in 6-ton lots delivered farmer's nearest station up to June 30, 1938: November, £7 8s.; December, £7 9s. 6d.; January, 1938, £7 11s.; February, £7 12s. 6d.; March/June, £7 14s.

CALCIUM CYANAMIDE.—The following prices are for delivery in 5-ton lots, carriage paid to any railway station in Great Britain up to June 30, 1938: November, £7 10s.; December, £7 11s. 3d.; January, 1938, £7 12s. 6d.; February, £7 13s. 9d.; March, £7 15s.; April/June, £7 16s. 3d.

NITRO CHALK.—£7 10s. 6d. per ton up to June 30, 1938.

SODIUM NITRATE.—£8 per ton for delivery up to June 30, 1938.

CONCENTRATED COMPLETE FERTILISERS.—£11 4s. to £11 13s. per ton in 6-ton lots to farmer's nearest station.

AMMONIUM PHOSPHATE FERTILISERS.—£10 19s. 6d. to £14 16s. 6d. per ton in 6-ton lots to farmer's nearest station.

Coal Tar Products

BENZOL.—At works, crude, 9½d. to 10d. per gal.; standard motor, 1s. 3d. to 1s. 3½d.; 90%, 1s. 4d. to 1s. 4½d.; pure, 1s. 8d. to 1s. 8½d. GLASGOW: Crude, 10d. to 10½d. per gal.; motor, 1s. 4d. to 1s. 4½d.

CARBOLIC ACID.—Crystals, 7½d. to 9d. per lb., small quantities would be dearer; Crude, 60's, 4s. to 4s. 3d., dehydrated, 4s. 6d. to 4s. 9d. per gal. MANCHESTER: Crystals, 9½d. per lb. f.o.b. in drums; crude, 4s. to 4s. 3d. per gal. GLASGOW: Crude, 60's, 4s. 3d. to 4s. 6d. per gal.; distilled, 60's.

CREOSOTE.—Home trade, 6¼d. to 6⅝d. per gal., f.o.r. makers' works; exports, 6⅝d. to 6¾d. per gal., according to grade. MANCHESTER: 5¼d. to 6¼d. GLASGOW: B.S.I. Specification, 6d. to 6¼d. per gal.; washed oil, 5d. to 5¼d.; lower sp. gr. oils, 5⅜d. to 6¼d.

CRESYLIC ACID.—97/99%, 4s. to 4s. 3d.; 99/100%, 4s. 6d. to 5s. 6d. per gal., according to specification; Pale, 99/100%, 4s. 6d. to 4s. 7d.; Dark, 95%, 3s. 8d. to 3s. 11d. per gal. GLASGOW: Pale, 99/100%, 5s. to 5s. 6d. per gal.; pale, 97/99%, 4s. 6d. to 4s. 10d., dark, 97/99%, 4s. 3d. to 4s. 6d.; high boiling acids, 2s. to 2s. 6d. American specification, 4s. 3d. to 4s. 6d. MANCHESTER: Pale, 99/100%, 4s.

NAPHTHA.—Solvent, 90/160, 1s. 6¼d. to 1s. 7¼d. per gal.; solvent, 95/160%, 1s. 7d. to 1s. 8d., naked at works; heavy 90/190%, 1s. 1½d. to 1s. 3d. per gal., naked at works, according to quantity. GLASGOW: Crude, 6¼d. to 7¼d. per gal.; 90%, 160, 1s. 5d. to 1s. 6d., 90%, 190, 1s. 1d. to 1s. 3d.

NAPHTHALENE.—Crude, whizzed or hot pressed, £7 10s. to £8 10s. per ton; purified crystals, £18 per ton in 2-cwt. bags. LONDON: Fire lighter quality, £5 10s. to £7 per ton. GLASGOW: Fire lighter, crude, £6 to £7 per ton (bags free). MANCHESTER: Refined, £18 per ton f.o.b.

PITCH.—Medium, soft, 36s. to 38s. per ton, f.o.b. MANCHESTER: 33s. f.o.b., East Coast. GLASGOW: f.o.b. Glasgow, 35s. to 37s. per ton; in bulk for home trade, 35s.

PYRIDINE.—90/140%, 12s. to 14s. 9d. per gal.; 90/160%, 11s. to 12s. 6d. per gal.; 90/180%, 3s. 3d. to 3s. 6d. per gal. f.o.b. GLASGOW: 90% 140, 10s. to 12s. per gal.; 90% 160, 9s. to 10s.; 90% 180, 2s. 6d. to 3s. MANCHESTER: 12s. 6d. to 14s. per gal.

TOLUOL.—90%, 1s. 10½d. per gal.; pure, 2s. 3½d. to 2s. 4½d. GLASGOW: 90% 120, 1s. 10d. to 2s. 1d. per gal.

XYLOL.—Commercial, 2s. 2½d. per gal.; pure, 2s. 4½d. GLASGOW: Commercial, 2s. to 2s. 1d. per gal.

Wood Distillation Products

CALCIUM ACETATE.—Brown, £7 15s. to £8 5s. per ton; grey, £10 to £11. Liquor, brown, 30° Tw., 6d. to 8d. per gal. MANCHESTER: Brown, £9 10s.; grey, £11 10s.

METHYL ACETONE.—40-50%, £40 to £42 per ton.

WOOD CREOSOTE.—Unrefined 6d. to 9d. per gal., according to boiling range.

WOOD NAPHTHA, MISCIBLE.—2s. 8d. to 3s. 3d. per gal.; solvent, 3s. 6d. to 3s. 9d. per gal.

WOOD TAR.—£2 to £8 per ton, according to quality.

Intermediates and Dyes

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.

ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.

BENZIDINE, HCl.—2s. 5d. per lb., 100% as base, in casks.

BENZOIC ACID, 1914 B.P. (ex toluol).—1s. 9½d. per lb. d/d buyer's works.

m-CRESOL 98/100%.—1s. 8d. to 1s. 9d. per lb. in ton lots.

o-CRESOL 30/31° C.—6½d. to 7½d. per lb. in 1-ton lots.

p-CRESOL, 34-5° C.—1s. 7d. to 1s. 8d. per lb. in ton lots.

DICHLORANILINE.—1s. 11½d. to 2s. 3d. per lb.

DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.

DINITROBENZENE.—7½d. per lb.

DINITROCHLORBENZENE, SOLID.—£72 per ton.

DINITROTOLUENE.—48/50° C., 8½d. per lb.; 66/68° C., 10d.

DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works

GAMMA ACID.—Spot, 4s. per lb. 100% d/d buyer's works.

H ACID.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.

NAPHTHIONIC ACID.—1s. 8d. per lb

α-NAPHTHOL.—Spot, 2s. 4d. per lb., d/d buyer's works.

β-NAPHTHOL.—9½d. to 9⅝d. per lb.; flake, 9½d. to 9⅝d.

α-NAPHTHYLAMINE.—Lumps, 1s. per lb.; ground, 1s. 0½d. in casks.

β-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb., d/d buyer's works.

NEVILLE AND WINTHER'S ACID.—Spot, 3s. per lb. 100%.

o-NITRANILINE.—3s. 11d. per lb.

m-NITRANILINE.—Spot, 2s. 7d. per lb. d/d buyer's works.

p-NITRANILINE.—Spot, 1s. 8d. to 2s. 1d. per lb. d/d buyer's works.

NITROBENZENE.—Spot, 4½d. to 5d. per lb., in 90-gal. drums, drums extra. 1-ton lots d/d buyer's works.

NITRONAPHTHALENE.—9½d. to 10d. per lb.; P.G., 1s. 0½d. per lb.

SODIUM NAPHTHIONATE.—Spot, 1s. 9d. per lb., 100% d/d buyer's works.

SULPHANILIC ACID.—Spot, 8d. per lb. 100%, d/d buyer's works.

o-TOLUIDINE.—10½d. per lb., in 8/10-cwt. drums, drums extra.

p-TOLUIDINE.—1s. 10½d. per lb., in casks.

m-XYLIDINE ACETATE.—4s. 3d. per lb., 100%.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

ALPHA CEMENT, LTD., London, W.C. (M., 1/1/38.) December 9, Trust Deed (supplemental to Trust Deed dated May 24, 1934, and deeds supplemental thereto). charged on lands at Belhus, Rainham, etc. *£591,000. Feb. 16, 1937.

TRINIDAD OIL LANDS, LTD., London, E.C. (M., 1/1/38.) December 10, Trust Deed dated November 20, 1937, securing £35,000, present issue £22,855; general charge. *Nil. January 14, 1937.

BABBITT PRODUCTS, LTD., London, N.W., soap manufacturers, etc. (M., 1/1/38.) December 17, £800 debentures, part of £5,000 already registered.

BRITISH SMOKELESS AND OIL FUELS, LTD., London, E.C. (M., 1/1/38.) December 15, £3,000 debenture, to J. C. Sherburn, Bournemouth; general charge. *—. December 31, 1936.

Satisfactions

ACME SOAP CO., LTD., Manchester. (M.S., 1/1/38.) Satisfaction December 16, of debentures registered June 23, 1937, to extent of £300.

County Court Judgment

JETGLAZE, LTD., Jetglaze Works, Booth Road, Colindale, paint manufacturers. (C.C., 1/1/38.) £58 2s. 5d. November 10.

Declaration of Solvency Filed

LINFOOT AND COOPER, LTD., London, E., colour and varnish manufacturers. (D.S., 1/1/38.) December 10.

Order Made on Application for Discharge

DUPLOYEN, Victor, antiseptic manufacturer, lately carrying on business at Imperial Buildings, Westgate Road, Newcastle-upon-Tyne. (O.M.A.D., 1/1/38.) Discharge suspended for three months, until February 17, 1938.

WOOD, Cyril Claude, acid manufacturer, lately carrying on business at Preston Street, Exeter. (O.M.A.D., 1/1/38.) Discharge suspended for three months, until February 12, 1938.

Companies Winding-up Voluntarily

THE DAVIS PETROL SOAP COMPANY, LTD. (C.W.U.V., 1/1/38.) December 20, F. J. Connor, 3 York Street, Manchester, Incorporated Accountant, appointed as liquidator members' winding-up.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Czechoslovakia.—A firm of importers established at Prague wishes to obtain the representation of United Kingdom exporters of plastics, chemicals, and dyestuffs. (Ref. No. 406.)

Spain (Canary Islands).—An agent established at Teneriffe, who is at present in the United Kingdom, wishes to obtain the representation, on a commission basis, of United Kingdom exporters of chemical manures, and essences. (Ref. No. 407.)

Egypt.—With reference to the notice in the "Board of Trade Journal" of December 9, 1937 (page 771), relating to the call for tenders by the Egyptian Ministry of Education, Stores Department, for the supply and delivery to the Trade Schools during the year 1937-38 of quantities of painting and decorating materials, the Commercial Counsellor to H.M. Embassy in Egypt has now been informed that the time fixed for submitting samples to the Stores Department is January 4, 1938, and not December 15, 1937, as previously stated. (Ref. T.Y. 28789/37.)

Sweden.—A firm established at Gothenburg wish to secure the representation, on a commission basis, of United Kingdom manufacturers of chemicals for the woodpulp and paper industries. (Ref. No. 432.)

British West Indies.—A United Kingdom firm of export merchants and agents with old-established and well connected organisation in the West Indies is desirous of hearing from United Kingdom manufacturers of linseed oil. (Ref. No. 413.)

New Zealand.—H.M. Trade Commissioner at Wellington reports that the Invercargill City Council (Waterworks Department) is calling for tenders, to be presented in New Zealand by March 11, 1938, for the supply, erection and setting to work of water-treatment plant. (Ref. T.Y. 31768/37.)

Forthcoming Events

London.

January 3.—Society of Chemical Industry. Joint meeting with the Plastics Group. Burlington House, Piccadilly, W.1. 8 p.m. B. A. Adams, "Ionic Exchange by Adsorption on Synthetic Resins."

January 11.—Pharmaceutical Society of Great Britain. 17 Bloomsbury Square, W.C.1. 8.30 p.m. Professor A. Wolf, "Some Aspects of the History of Pharmacy."

Society of Glass Technology. Annual dinner at the Trocadero Restaurant at 7.15 p.m.

January 12.—Society of Glass Technology. Institution of Electrical Engineers, Savoy Place, Victoria Embankment, S.W.1. Series of lectures. W. M. Hampton, "New Developments in the Field of Optical Glass." Professor W. E. S. Turner, "Glass for General Scientific and Heat Resisting Purposes," etc.

Electrodepositors' Technical Society. Northampton Polytechnic Institute, St. John Street, Clerkenwell. 8.15 p.m. A. I. Wynn-Williams, "Materials of Construction in Electrodeposition Plant."

January 13.—Institute of the Plastics Industry. British Industries House, Marble Arch, W.1. 7.30 p.m. Walter Landauer, "Design and the Plastics Industry."

Birmingham.

January 4.—Electrodepositors' Technical Society. James Watt Memorial Institute, Gt. Charles Street. 7.30 p.m. J. V. Ruston, "The Anodic Treatment of Aluminium and its Alloys."

January 14.—Institute of the Plastics Industry. Joint meeting with the Birmingham Section and Plastics Group of the Society of Chemical Industry. James Watt Memorial Institute. 8 p.m. H. V. Potter, "The Economics of the Plastics Industry."

Bristol.

January 14.—Society of Chemical Industry. Woodland Road. 7.30 p.m. Joint meeting with Chemical Engineering Group. "Early Development of Chemical Industry in Bristol."

Liverpool.

January 13.—Institute of Chemistry. Constitutional Club, India Buildings, Water Street. 7.30 p.m. Professor T. P. Hilditch, "Fats, Facts and Figures."

Manchester.

January 10.—Institute of the Plastics Industry. (Northern Section) The Engineers' Club, 17 Albert Square. 7.15 p.m. "Design of Injection Moulds."

January 11.—Institute of Fuel. Engineers' Club, 17 Albert Square. 7 p.m. W. C. Whalley, "Internal Combustion Engine Fuels from the Operator's Point of View."

Company News

A. Boake, Roberts and Co. announce a third interim of 1½ per cent., free of tax (2 per cent.).

Palestine Potash, Ltd., has decided to pay the usual half-yearly dividend on the £19,838 7½ per cent. cumulative redeemable preference shares and the £349,450 5½ per cent. cumulative redeemable participating preference shares on December 31.

English Clays Lovering Pochin and Co. have decided to pay a final dividend of 3 per cent., less tax, making a total of 4½ per cent., less tax, for the year ended September 30. In the previous financial year an interim dividend of 1 per cent. was followed by a final of 2 per cent., making 3 per cent., less tax, which was also paid in 1934-35.

Van den Berghs and Jurgens, Ltd., margarine manufacturers, have declared an interim dividend of 4 per cent. on the ordinary stock. No interim was paid last year, but in March this year 7 per cent. was declared in respect of the year 1936. The company, which is controlled by Unilever, Ltd., and Unilever N.V., has an authorised and issued capital of £8,637,500.

British Burmah Petroleum Co., Ltd., earned trading profits of £75,765 in the year to end-July last—an increase of £32,553 on the previous year. Total income amounted to £88,332, against £116,314, which included a profit on the sale of shares of £65,416. Debenture interest, depreciation, tax and exchange, etc., absorb £78,845, leaving £9,488. In addition, credits amounting to £11,662 are brought in. After providing £20,400 for the sinking fund, the carry-forward is raised from £823 to £1,574. No dividend has been paid since 1930-31.

Dussek Bros., oil refiners, in their report for the year ended October 31, show net profit of £15,459; add balance brought in £11,089; profit on sale of investment £834, making £27,382. Preference dividends absorb £2,975; income tax and N.D.C. £2,043; expense in connection with issue written off £2,351 (leaving balance of £1,500 on this account); final dividend of 5 per cent., making 8 per cent., less tax; £12,004 forward. The report adds that the directors regret net profits have not reached the anticipated figure, and although the company's turnover has increased by approximately 16 per cent., net profits have not increased proportionately with this increased turnover, mainly due to increase in cost of all raw materials and moreover owing to increased cost of fuel and labour.